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WHAT IS CLAIMED IS:

1. A composition, comprising:

a human interleukin-3 mutant polypeptide of the

5 Formula:

	Ala	Pro	Met	Thr	Gln	Thr	Thr	Ser	Leu	Lys	Thr	Ser	Trp	Val	Asn	
	1				5					10					15	
10	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					20					25					30	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asn	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					35					40					45	
15	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					50					55					60	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
20					65					70					75	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					80					85					90	
25	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					95					100					105	
	Xaa	Phe	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					110					115					120	
30	Xaa	Xaa	Xaa	Gln	Gln	Thr	Thr	Leu	Ser	Leu	Ala	Ile	Phe			
					125					130						

[SEQ ID NO:1]

35 wherein

Xaa at position 17 is Ser, Lys, Gly, Asp, Met, Gln, or

Arg;  
Xaa at position 18 is Asn, His, Leu, Ile, Phe, Arg, or  
Gln;  
Xaa at position 19 is Met, Phe, Ile, Arg, Gly, Ala, or  
5 Cys;  
Xaa at position 20 is Ile, Cys, Gln, Glu, Arg, Pro, or  
Ala;  
Xaa at position 21 is Asp, Phe, Lys, Arg, Ala, Gly, Glu,  
Gln, Asn, Thr, Ser or Val;  
10 Xaa at position 22 is Glu, Trp, Pro, Ser, Ala, His, Asp,  
Asn, Gln, Leu, Val or Gly;  
Xaa at position 23 is Ile, Val, Ala, Leu, Gly, Trp, Lys,  
Phe, Leu, Ser, or Arg;  
Xaa at position 24 is Ile, Gly, Val, Arg, Ser, Phe, or  
15 Leu;  
Xaa at position 25 is Thr, His, Gly, Gln, Arg, Pro, or  
Ala;  
Xaa at position 26 is His, Thr, Phe, Gly, Arg, Ala, or  
Trp;  
20 Xaa at position 27 is Leu, Gly, Arg, Thr, Ser, or Ala;  
Xaa at position 28 is Lys, Arg, Leu, Gln, Gly, Pro, Val or  
Trp;  
Xaa at position 29 is Gln, Asn, Leu, Pro, Arg, or Val;  
Xaa at position 30 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
25 Leu, or Lys;  
Xaa at position 31 is Pro, Asp, Gly, Ala, Arg, Leu, or  
Gln;  
Xaa at position 32 is Leu, Val, Arg, Gln, Asn, Gly, Ala,  
or Glu;  
30 Xaa at position 33 is Pro, Leu, Gln, Ala, Thr, or Glu;  
Xaa at position 34 is Leu, Val, Gly, Ser, Lys, Glu, Gln,  
Thr, Arg, Ala, Phe, Ile or Met;  
Xaa at position 35 is Leu, Ala, Gly, Asn, Pro, Gln, or  
Val;  
35 Xaa at position 36 is Asp, Leu, or Val;  
Xaa at position 37 is Phe, Ser, Pro, Trp, or Ile;

- Xaa at position 38 is Asn, or Ala;  
Xaa at position 40 is Leu, Trp, or Arg;  
Xaa at position 41 is Asn, Cys, Arg, Leu, His, Met, or  
Pro;
- 5 Xaa at position 42 is Gly, Asp, Ser, Cys, Asn, Lys, Thr,  
Leu, Val, Glu, Phe, Tyr, Ile, Met or Ala;  
Xaa at position 43 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
Cys, Gln, Arg, Thr, Gly or Ser;  
Xaa at position 44 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
10 Trp, Glu, Asn, Gln, Ala or Pro;  
Xaa at position 45 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
Lys, Trp, Asp, Asn, Arg, Ser, Ala, Ile, Glu or His;  
Xaa at position 46 is Asp, Phe, Ser, Thr, Cys, Glu, Asn,  
Gln, Lys, His, Ala, Tyr, Ile, Val or Gly;
- 15 Xaa at position 47 is Ile, Gly, Val, Ser, Arg, Pro, or  
His;  
Xaa at position 48 is Leu, Ser, Cys, Arg, Ile, His, Phe,  
Glu, Lys, Thr, Ala, Met, Val or Asn;  
Xaa at position 49 is Met, Arg, Ala, Gly, Pro, Asn, His,  
20 or Asp;  
Xaa at position 50 is Glu, Leu, Thr, Asp, Tyr, Lys, Asn,  
Ser, Ala, Ile, Val, His, Phe, Met or Gln;  
Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;
- 25 Xaa at position 52 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;  
Xaa at position 53 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
Ser, or Met;  
Xaa at position 54 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
30 Asn, Lys, His, Ala or Leu;  
Xaa at position 55 is Arg, Thr, Val, Ser, Leu, or Gly;  
Xaa at position 56 is Pro, Gly, Cys, Ser, Gln, Glu, Arg,  
His, Thr, Ala, Tyr, Phe, Leu, Val or Lys;  
Xaa at position 57 is Asn or Gly;
- 35 Xaa at position 58 is Leu, Ser, Asp, Arg, Gln, Val, or  
Cys;

- Xaa at position 59 is Glu Tyr, His, Leu, Pro, or Arg;  
Xaa at position 60 is Ala, Ser, Pro, Tyr, Asn, or Thr;  
Xaa at position 61 is Phe, Asn, Glu, Pro, Lys, Arg, or  
Ser;
- 5 Xaa at position 62 is Asn His, Val, Arg, Pro, Thr, Asp, or  
Ile;
- Xaa at position 63 is Arg, Tyr, Trp, Lys, Ser, His, Pro,  
or Val;
- Xaa at position 64 is Ala, Asn, Pro, Ser, or Lys;
- 10 Xaa at position 65 is Val, Thr, Pro, His, Leu, Phe, or  
Ser;
- Xaa at position 66 is Lys, Ile, Arg, Val, Asn, Glu, or  
Ser;
- Xaa at position 67 is Ser, Ala, Phe, Val, Gly, Asn, Ile,  
15 Pro, or His;
- Xaa at position 68 is Leu, Val, Trp, Ser, Ile, Phe, Thr,  
or His;
- Xaa at position 69 is Gln, Ala, Pro, Thr, Glu, Arg, Trp,  
Gly, or Leu;
- 20 Xaa at position 70 is Asn, Leu, Val, Trp, Pro, or Ala;  
Xaa at position 71 is Ala, Met, Leu, Pro, Arg, Glu, Thr,  
Gln, Trp, or Asn;
- Xaa at position 72 is Ser, Glu, Met, Ala, His, Asn, Arg,  
or Asp;
- 25 Xaa at position 73 is Ala, Glu, Asp, Leu, Ser, Gly, Thr,  
or Arg;
- Xaa at position 74 is Ile, Met, Thr, Pro, Arg, Gly, Ala;  
Xaa at position 75 is Glu, Lys, Gly, Asp, Pro, Trp, Arg,  
Ser, Gln, or Leu;
- 30 Xaa at position 76 is Ser, Val, Ala, Asn, Trp, Glu, Pro,  
Gly, or Asp;
- Xaa at position 77 is Ile, Ser, Arg, Thr, or Leu;  
Xaa at position 78 is Leu, Ala, Ser, Glu, Phe, Gly, or  
Arg;
- 35 Xaa at position 79 is Lys, Thr, Asn, Met, Arg, Ile, Gly,  
or Asp;

- Xaa at position 80 is Asn, Trp, Val, Gly, Thr, Leu, Glu,  
or Arg;
- Xaa at position 81 is Leu, Gln, Gly, Ala, Trp, Arg, Val,  
or Lys;
- 5 Xaa at position 82 is Leu, Gln, Lys, Trp, Arg, Asp, Glu,  
Asn, His, Thr, Ser, Ala, Tyr, Phe, Ile, Met or Val;
- Xaa at position 83 is Pro, Ala, Thr, Trp, Arg, or Met;
- Xaa at position 84 is Cys, Glu, Gly, Arg, Met, or Val;
- Xaa at position 85 is Leu, Asn, Val, or Gln;
- 10 Xaa at position 86 is Pro, Cys, Arg, Ala, or Lys;
- Xaa at position 87 is Leu, Ser, Trp, or Gly;
- Xaa at position 88 is Ala, Lys, Arg, Val, or Trp;
- Xaa at position 89 is Thr, Asp, Cys, Leu, Val, Glu, His,  
Asn, or Ser;
- 15 Xaa at position 90 is Ala, Pro, Ser, Thr, Gly, Asp, Ile,  
or Met;
- Xaa at position 91 is Ala, Pro, Ser, Thr, Phe, Leu, Asp,  
or His;
- Xaa at position 92 is Pro, Phe, Arg, Ser, Lys, His, Ala,  
Gly, Ile or Leu;
- 20 Xaa at position 93 is Thr, Asp, Ser, Asn, Pro, Ala, Leu,  
or Arg;
- Xaa at position 94 is Arg, Ile, Ser, Glu, Leu, Val, Gln,  
Lys, His, Ala, or Pro;
- 25 Xaa at position 95 is His, Gln, Pro, Arg, Val, Leu, Gly,  
Thr, Asn, Lys, Ser, Ala, Trp, Phe, Ile, or Tyr;
- Xaa at position 96 is Pro, Lys, Tyr, Gly, Ile, or Thr;
- Xaa at position 97 is Ile, Val, Lys, Ala, or Asn;
- Xaa at position 98 is His, Ile, Asn, Leu, Asp, Ala, Thr,  
Glu, Gln, Ser, Phe, Met, Val, Lys, Arg, Tyr or Pro;
- 30 Xaa at position 99 is Ile, Leu, Arg, Asp, Val, Pro, Gln,  
Gly, Ser, Phe, or His;
- Xaa at position 100 is Lys, Tyr, Leu, His, Arg, Ile, Ser,  
Gln, or Pro;
- 35 Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Val,  
Tyr, Glu, Asn, Ser, Ala, Gly, Ile, Leu, or Gln;

- Xaa at position 102 is Gly, Leu, Glu, Lys, Ser, Tyr, or  
Pro;
- Xaa at position 103 is Asp, or Ser;
- Xaa at position 104 is Trp, Val, Cys, Tyr, Thr, Met, Pro,  
5 Leu, Gln, Lys, Ala, Phe, or Gly;
- Xaa at position 105 is Asn, Pro, Ala, Phe, Ser, Trp, Gln,  
Tyr, Leu, Lys, Ile, Asp, or His;
- Xaa at position 106 is Glu, Ser, Ala, Lys, Thr, Ile, Gly,  
or Pro;
- 10 Xaa at position 108 is Arg, Lys, Asp, Leu, Thr, Ile, Gln,  
His, Ser, Ala or Pro;
- Xaa at position 109 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser,  
or Gly;
- Xaa at position 110 is Lys, Ala, Asn, Thr, Leu, Arg, Gln,  
15 His, Glu, Ser, Ala, or Trp;
- Xaa at position 111 is Leu, Ile, Arg, Asp, or Met;
- Xaa at position 112 is Thr, Val, Gln, Tyr, Glu, His, Ser,  
or Phe;
- Xaa at position 113 is Phe, Ser, Cys, His, Gly, Trp, Tyr,  
20 Asp, Lys, Leu, Ile, Val or Asn;
- Xaa at position 114 is Tyr, Cys, His, Ser, Trp, Arg, or  
Leu;
- Xaa at position 115 is Leu, Asn, Val, Pro, Arg, Ala, His,  
Thr, Trp, or Met;
- 25 Xaa at position 116 is Lys, Leu, Pro, Thr, Met, Asp, Val,  
Glu, Arg, Trp, Ser, Asn, His, Ala, Tyr, Phe, Gln, or  
Ile;
- Xaa at position 117 is Thr, Ser, Asn, Ile, Trp, Lys, or  
Pro;
- 30 Xaa at position 118 is Leu, Ser, Pro, Ala, Glu, Cys, Asp,  
or Tyr;
- Xaa at position 119 is Glu, Ser, Lys, Pro, Leu, Thr, Tyr,  
or Arg;
- Xaa at position 120 is Asn, Ala, Pro, Leu, His, Val, or  
35 Gln;
- Xaa at position 121 is Ala, Ser, Ile, Asn, Pro, Lys, Asp,

or Gly;  
 Xaa at position 122 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
 His, Ile, Tyr, or Cys;  
 Xaa at position 123 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
 5 or Leu;

and which can additionally have Met- preceding the amino  
 acid in position 1; and wherein from 1 to 14 amino acids  
 can be deleted from the N-terminus and/or from 1 to 15  
 10 amino acids can be deleted from the C-terminus; and wherein  
 from 4 to 44 of the amino acids designated by Xaa are  
 different from the corresponding amino acids of native (1-  
 133) human interleukin-3;

15 a colony stimulating factor; and  
 at least one non-toxic pharmaceutically acceptable  
 carrier.

2. A composition, comprising:  
 20 a human interleukin-3 mutant polypeptide of the  
 Formula:

Ala	Pro	Met	Thr	Gln	Thr	Thr	Ser	Leu	Lys	Thr	Ser	Trp	Val	Asn	
1				5					10					15	
25	Cys	Xaa	Xaa	Xaa	Ile	Xaa	Glu	Xaa	Xaa	Xaa	Xaa	Leu	Lys	Xaa	Xaa
				20					25					30	
	Xaa	Xaa	Xaa	Xaa	Asp	Xaa	Xaa	Asn	Leu	Asn	Xaa	Glu	Xaa	Xaa	
30				35					40					45	
	Xaa	Ile	Leu	Met	Xaa	Xaa	Asn	Leu	Xaa	Xaa	Xaa	Asn	Leu	Glu	Xaa
				50					55					60	
35	Phe	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asn	Xaa	Xaa	Xaa	Ile	Glu
				65						70					75

Xaa Xaa Leu Xaa Xaa Leu Xaa Xaa Cys Xaa Pro Xaa Xaa Thr Ala  
                                     80                                    85                                    90  
 5 Xaa Pro Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Asp Xaa Xaa  
                                     95                                    100                                    105  
 Xaa Phe Xaa Xaa Lys Leu Xaa Phe Xaa Xaa Xaa Xaa Leu Glu Xaa  
                                     110                                    115                                    120  
 10 Xaa Xaa Xaa Gln Gln Thr Thr Leu Ser Leu Ala Ile Phe [SEQ ID NO:2]  
                                     125                                    130

wherein

- 15 Xaa at position 17 is Ser, Gly, Asp, Met, or Gln;  
 Xaa at position 18 is Asn, His, or Ile;  
 Xaa at position 19 is Met or Ile;  
 Xaa at position 21 is Asp or Glu;  
 Xaa at position 23 is Ile, Ala, Leu, or Gly;  
 20 Xaa at position 24 is Ile, Val, or Leu;  
 Xaa at position 25 is Thr, His, Gln, or Ala;  
 Xaa at position 26 is His or Ala;  
 Xaa at position 29 is Gln, Asn, or Val;  
 Xaa at position 30 is Pro, Gly, or Gln;  
 25 Xaa at position 31 is Pro, Asp, Gly, or Gln;  
 Xaa at position 32 is Leu, Arg, Gln, Asn, Gly, Ala, or  
     Glu;  
 Xaa at position 33 is Pro or Glu;  
 Xaa at position 34 is Leu, Val, Gly, Ser, Lys, Ala, Arg,  
 30 Gln, Glu, Ile, Phe, Thr or Met;  
 Xaa at position 35 is Leu, Ala, Asn, Pro, Gln, or Val;  
 Xaa at position 37 is Phe, Ser, Pro, or Trp;  
 Xaa at position 38 is Asn or Ala;  
 Xaa at position 42 is Gly, Asp, Ser, Cys, Ala, Asn, Ile,  
 35 Leu, Met, Tyr or Arg;  
 Xaa at position 44 is Asp or Glu;



- Xaa at position 45 is Gln, Val, Met, Leu, Thr, Ala, Asn,  
Glu, Ser or Lys;
- Xaa at position 46 is Asp, Phe, Ser, Thr, Ala, Asn Gln,  
Glu, His, Ile, Lys, Tyr, Val or Cys;
- 5 Xaa at position 50 is Glu, Ala, Asn, Ser or Asp;  
Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;
- Xaa at position 54 is Arg or Ala;
- Xaa at position 55 is Arg, Thr, Val, Leu, or Gly;
- 10 Xaa at position 56 is Pro, Gly, Ser, Gln, Ala, Arg, Asn,  
Glu, Leu, Thr, Val or Lys;
- Xaa at position 60 is Ala or Ser;
- Xaa at position 62 is Asn, Pro, Thr, or Ile;
- Xaa at position 63 is Arg or Lys;
- 15 Xaa at position 64 is Ala or Asn;
- Xaa at position 65 is Val or Thr;
- Xaa at position 66 is Lys or Arg;
- Xaa at position 67 is Ser, Phe, or His;
- Xaa at position 68 is Leu, Ile, Phe, or His;
- 20 Xaa at position 69 is Gln, Ala, Pro, Thr, Glu, Arg, or  
Gly;
- Xaa at position 71 is Ala, Pro, or Arg;
- Xaa at position 72 is Ser, Glu, Arg, or Asp;
- Xaa at position 73 is Ala or Leu;
- 25 Xaa at position 76 is Ser, Val, Ala, Asn, Glu, Pro, or  
Gly;
- Xaa at position 77 is Ile or Leu;
- Xaa at position 79 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
Gly, or Asp;
- 30 Xaa at position 80 is Asn, Gly, Glu, or Arg;
- Xaa at position 82 is Leu, Gln, Trp, Arg, Asp, Ala, Asn,  
Glu, His, Ile, Met, Phe, Ser, Thr, Tyr or Val;
- Xaa at position 83 is Pro or Thr;
- Xaa at position 85 is Leu or Val;
- 35 Xaa at position 87 is Leu or Ser;
- Xaa at position 88 is Ala or Trp;

- Xaa at position 91 is Ala or Pro;  
Xaa at position 93 is Thr, Asp, Ser, Pro, Ala, Leu, or  
Arg;  
Xaa at position 95 is His, Pro, Arg, Val, Leu, Gly, Asn,  
5 Phe, Ser or Thr;  
Xaa at position 96 is Pro or Tyr;  
Xaa at position 97 is Ile or Val;  
Xaa at position 98 is His, Ile, Asn, Leu, Ala, Thr, Leu,  
Arg, Gln, Leu, Lys, Met, Ser, Tyr, Val or Pro;  
10 Xaa at position 99 is Ile, Leu, or Val;  
Xaa at position 100 is Lys, Arg, Ile, Gln, Pro, or Ser;  
Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Pro,  
Asn, Ile, Leu or Tyr;  
Xaa at position 104 is Trp or Leu;  
15 Xaa at position 105 is Asn, Pro, Ala, Ser, Trp, Gln, Tyr,  
Leu, Lys, Ile, Asp, or His;  
Xaa at position 106 is Glu or Gly;  
Xaa at position 108 is Arg, Ala, or Ser;  
Xaa at position 109 is Arg, Thr, Glu, Leu, or Ser;  
20 Xaa at position 112 is Thr, Val, or Gln;  
Xaa at position 114 is Tyr or Trp;  
Xaa at position 115 is Leu or Ala;  
Xaa at position 116 is Lys, Thr, Val, Trp, Ser, Ala, His,  
Met, Phe, Tyr or Ile;  
25 Xaa at position 117 is Thr or Ser;  
Xaa at position 120 is Asn, Pro, Leu, His, Val, or Gln;  
Xaa at position 121 is Ala, Ser, Ile, Asn, Pro, Asp, or  
Gly;  
Xaa at position 122 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
30 His, Ile, Tyr, or Cys;  
Xaa at position 123 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
or Leu;

- and which can additionally have Met- preceding the amino  
35 acid in position 1; and wherein from 1 to 14 amino acids  
can be deleted from the N-terminus and/or from 1 to 15

amino acids can be deleted from the C-terminus; and wherein from 4 to 35 of the amino acids designated by Xaa are different from the corresponding amino acids of native (1-133)human interleukin-3;

5 a colony stimulating factor selected from the group consisting of GM-CSF, CSF-1, G-CSF, Meg-CSF (more recently referred to as c-mpl ligand), M-CSF, erythropoietin (EPO), IL-1, IL-4, IL-2, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, LIF, flt3/flk2, human growth hormone, B-  
10 cell growth factor, B-cell differentiation factor, eosinophil differentiation factor and stem cell factor (SCF); and

at least one non-toxic pharmaceutically acceptable carrier.

15

3. A composition of claim 2, wherein said human interleukin-3 mutant polypeptide is of the Formula:

20	Ala	Pro	Met	Thr	Gln	Thr	Thr	Ser	Leu	Lys	Thr	Ser	Trp	Val	Asn
	1				5					10					15
	Cys	Xaa	Xaa	Met	Ile	Asp	Glu	Xaa	Ile	Xaa	Xaa	Leu	Lys	Xaa	Xaa
					20					25					30
25	Pro	Xaa	Pro	Xaa	Xaa	Asp	Phe	Xaa	Asn	Leu	Asn	Xaa	Glu	Asp	Xaa
					35					40					45
	Xaa	Ile	Leu	Met	Xaa	Xaa	Asn	Leu	Arg	Xaa	Xaa	Asn	Leu	Glu	Ala
					50					55					60
30	Phe	Xaa	Arg	Xaa	Xaa	Lys	Xaa	Xaa	Xaa	Asn	Ala	Ser	Ala	Ile	Glu
					65					70					75
	Xaa	Xaa	Leu	Xaa	Xaa	Leu	Xaa	Pro	Cys	Leu	Pro	Xaa	Xaa	Thr	Ala
35					80					85					90

wherein

Xaa at position 17 is Ser, Gly, Asp, or Gln;  
Xaa at position 18 is Asn, His, or Ile;  
Xaa at position 23 is Ile, Ala, Leu, or Gly;  
15 Xaa at position 25 is Thr, His, or Gln;  
Xaa at position 26 is His or Ala;  
Xaa at position 29 is Gln or Asn;  
Xaa at position 30 is Pro or Gly;  
Xaa at position 32 is Leu, Arg, Asn, or Ala;  
20 Xaa at position 34 is Leu, Val, Ser, Ala, Arg, Gln, Glu,  
Ile, Phe, Thr, or Met;  
Xaa at position 35 is Leu, Ala, Asn, or Pro;  
Xaa at position 38 is Asn or Ala;  
Xaa at position 42 is Gly, Asp, Ser, Ala, Asn, Ile, Leu,  
25 Met, Tyr or Arg;  
Xaa at position 45 is Gln, Val, Met, Leu, Ala, Asn, Glu,  
or Lys;  
Xaa at position 46 is Asp, Phe, Ser, Gln, Glu, His, Val  
or Thr;  
30 Xaa at position 50 is Glu Asn, Ser or Asp;  
Xaa at position 51 is Asn, Arg, Pro, Thr, or His;  
Xaa at position 55 is Arg, Leu, or Gly;  
Xaa at position 56 is Pro, Gly, Ser, Ala, Asn, Val, Leu or  
Gln;  
35 Xaa at position 62 is Asn, Pro, or Thr;  
Xaa at position 64 is Ala or Asn;

- Xaa at position 65 is Val or Thr;  
Xaa at position 67 is Ser or Phe;  
Xaa at position 68 is Leu or Phe;  
Xaa at position 69 is Gln, Ala, Glu, or Arg;  
5 Xaa at position 76 is Ser, Val, Asn, Pro, or Gly;  
Xaa at position 77 is Ile or Leu;  
Xaa at position 79 is Lys, Gly, Asn, Met, Arg, Ile, or  
Gly;  
Xaa at position 80 is Asn, Gly, Glu, or Arg;  
10 Xaa at position 82 is Leu, Gln, Trp, Arg, Asp, Asn, Glu,  
His, Met, Phe, Ser, Thr, Tyr or Val;  
Xaa at position 87 is Leu or Ser;  
Xaa at position 88 is Ala or Trp;  
Xaa at position 91 is Ala or Pro;  
15 Xaa at position 93 is Thr, Asp, or Ala;  
Xaa at position 95 is His, Pro, Arg, Val, Gly, Asn, Ser or  
Thr;  
Xaa at position 98 is His, Ile, Asn, Ala, Thr, Gln, Glu,  
Lys, Met, Ser, Tyr, Val or Leu;  
20 Xaa at position 99 is Ile or Leu;  
Xaa at position 100 is Lys or Arg;  
Xaa at position 101 is Asp, Pro, Met, Lys, Thr, His, Pro,  
Asn, Ile, Leu or Tyr;  
Xaa at position 105 is Asn, Pro, Ser, Ile or Asp;  
25 Xaa at position 108 is Arg, Ala, or Ser;  
Xaa at position 109 is Arg, Thr, Glu, Leu, or Ser;  
Xaa at position 112 is Thr or Gln;  
Xaa at position 116 is Lys, Val, Trp, Ala, His, Phe, Tyr  
or Ile;  
30 Xaa at position 117 is Thr or Ser;  
Xaa at position 120 is Asn, Pro, Leu, His, Val, or Gln;  
Xaa at position 121 is Ala, Ser, Ile, Pro, or Asp;  
Xaa at position 122 is Gln, Met, Trp, Phe, Pro, His, Ile,  
or Tyr;  
35 Xaa at position 123 is Ala, Met, Glu, Ser, or Leu;

and which can additionally have Met- preceding the amino acid in position 1; and wherein from 1 to 14 amino acids can be deleted from the N-terminus and/or from 1 to 15 amino acids can be deleted from the C-terminus; and wherein  
5 from 4 to 44 of the amino acids designated by Xaa are different from the corresponding amino acids of native (1-133)human interleukin-3.

4. A composition of claim 3, wherein said human  
10 interleukin-3 mutant polypeptide is of the Formula:

Xaa at position 42 is Gly, Asp, Ser, Ile, Leu, Met, Tyr,  
or Ala;  
Xaa at position 45 is Gln, Val, Met or Asn;  
15 Xaa at position 46 is Asp, Ser, Gln, His or Val;  
Xaa at position 50 is Glu or Asp;  
Xaa at position 51 is Asn, Pro or Thr;  
Xaa at position 62 is Asn or Pro;  
Xaa at position 76 is Ser, or Pro;  
20 Xaa at position 82 is Leu, Trp, Asp, Asn Glu, His, Phe,  
Ser or Tyr;  
Xaa at position 95 is His, Arg, Thr, Asn or Ser;  
Xaa at position 98 is His, Ile, Leu, Ala, Gln, Lys, Met,  
Ser, Tyr or Val;  
25 Xaa at position 100 is Lys or Arg;  
Xaa at position 101 is Asp, Pro, His, Asn, Ile or Leu;  
Xaa at position 105 is Asn, or Pro;  
Xaa at position 108 is Arg, Ala, or Ser;  
Xaa at position 116 is Lys, Val, Trp, Ala, His, Phe, or  
30 Tyr;  
Xaa at position 121 is Ala, or Ile;  
Xaa at position 122 is Gln, or Ile; and  
Xaa at position 123 is Ala, Met or Glu.

35 5. A composition, comprising:  
a human interleukin-3 mutant polypeptide of the

Formula:

	Asn	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
	1				5					10					15	
5																
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asn	Xaa	Xaa	Xaa	Xaa	Xaa	
					20					25					30	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
10					35					40					45	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					50					55					60	
15	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					65					70					75	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					80					85					90	
20																
	Xaa	Xaa	Phe	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					95					100					105	
	Xaa	Xaa	Xaa	Xaa	Gln	Gln	[SEQ ID NO:4]									
25					110											

wherein

	Xaa at position 3 is Ser, Lys, Gly, Asp, Met, Gln, or Arg;
	Xaa at position 4 is Asn, His, Leu, Ile, Phe, Arg, or Gln;
30	Xaa at position 5 is Met, Phe, Ile, Arg, Gly, Ala, or Cys;
	Xaa at position 6 is Ile, Cys, Gln, Glu, Arg, Pro, or Ala;
	Xaa at position 7 is Asp, Phe, Lys, Arg, Ala, Gly, Glu,
	Gln, Asn, Thr, Ser or Val;
	Xaa at position 8 is Glu, Trp, Pro, Ser, Ala, His, Asp,
35	Asn, Gln, Leu, Val, or Gly;
	Xaa at position 9 is Ile, Val, Ala, Leu, Gly, Trp, Lys,

Phe, Leu, Ser, or Arg;  
 Xaa at position 10 is Ile, Gly, Val, Arg, Ser, Phe, or  
 Leu;  
 Xaa at position 11 is Thr, His, Gly, Gln, Arg, Pro, or  
 5 Ala;  
 Xaa at position 12 is His, Thr, Phe, Gly, Arg, Ala, or  
 Trp;  
 Xaa at position 13 is Leu, Gly, Arg, Thr, Ser, or Ala;  
 Xaa at position 14 is Lys, Arg, Leu, Gln, Gly, Pro, Val or  
 10 Trp;  
 Xaa at position 15 is Gln, Asn, Leu, Pro, Arg, or Val;  
 Xaa at position 16 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
 Leu, or Lys;  
 Xaa at position 17 is Pro, Asp, Gly, Ala, Arg, Leu, or  
 15 Gln;  
 Xaa at position 18 is Leu, Val, Arg, Gln, Asn, Gly, Ala,  
 or Glu;  
 Xaa at position 19 is Pro, Leu, Gln, Ala, Thr, or Glu;  
 Xaa at position 20 is Leu, Val, Gly, Ser, Lys, Glu, Gln,  
 20 Thr, Arg, Ala, Phe, Ile or Met;  
 Xaa at position 21 is Leu, Ala, Gly, Asn, Pro, Gln, or  
 Val;  
 Xaa at position 22 is Asp, Leu, or Val;  
 Xaa at position 23 is Phe, Ser, Pro, Trp, or Ile;  
 25 Xaa at position 24 is Asn, or Ala;  
 Xaa at position 26 is Leu, Trp, or Arg;  
 Xaa at position 27 is Asn, Cys, Arg, Leu, His, Met, Pro;  
 Xaa at position 28 is Gly, Asp, Ser, Cys, Ala, Lys, Asn,  
 Thr, Leu, Val, Glu, Phe, Tyr, Ile or Met;  
 30 Xaa at position 29 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
 Cys, Gln, Arg, Thr, Gly or Ser;  
 Xaa at position 30 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
 Trp, Glu, Asn, Gln, Ala or Pro;  
 Xaa at position 31 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
 35 Lys, Asp, Asn, Arg, Ser, Ala, Ile, Glu, His or Trp;  
 Xaa at position 32 is Asp, Phe, Ser, Thr, Cys, Glu, Asn,



Gln, Lys, His, Ala, Tyr, Ile, Val or Gly;  
Xaa at position 33 is Ile, Gly, Val, Ser, Arg, Pro, or  
His;  
Xaa at position 34 is Leu, Ser, Cys, Arg, Ile, His, Phe,  
5 Glu, Lys, Thr, Ala, Met, Val or Asn;  
Xaa at position 35 is Met, Arg, Ala, Gly, Pro, Asn, His,  
or Asp;  
Xaa at position 36 is Glu, Leu, Thr, Asp, Tyr, Lys, Asn,  
Ser, Ala, Ile, Val, His, Phe, Met or Gln;  
10 Xaa at position 37 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 38 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;  
Xaa at position 39 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
15 Ser, Met, or;  
Xaa at position 40 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
Asn, Lys, His, Ala or Leu;  
Xaa at position 41 is Arg, Thr, Val, Ser, Leu, or Gly;  
Xaa at position 42 is Pro, Gly, Cys, Ser, Gln, Glu, Arg,  
20 His, Thr, Ala, Tyr, Phe, Leu, Val or Lys;  
Xaa at position 43 is Asn or Gly;  
Xaa at position 44 is Leu, Ser, Asp, Arg, Gln, Val, or  
Cys;  
Xaa at position 45 is Glu Tyr, His, Leu, Pro, or Arg;  
25 Xaa at position 46 is Ala, Ser, Pro, Tyr, Asn, or Thr;  
Xaa at position 47 is Phe, Asn, Glu, Pro, Lys, Arg, or  
Ser;  
Xaa at position 48 is Asn, His, Val, Arg, Pro, Thr, Asp,  
or Ile;  
30 Xaa at position 49 is Arg, Tyr, Trp, Lys, Ser, His, Pro,  
or Val;  
Xaa at position 50 is Ala, Asn, Pro, Ser, or Lys;  
Xaa at position 51 is Val, Thr, Pro, His, Leu, Phe, or  
Ser;  
35 Xaa at position 52 is Lys, Ile, Arg, Val, Asn, Glu, or  
Ser;

- Xaa at position 53 is Ser, Ala, Phe, Val, Gly, Asn, Ile,  
Pro, or His;
- Xaa at position 54 is Leu, Val, Trp, Ser, Ile, Phe, Thr,  
or His;
- 5 Xaa at position 55 is Gln, Ala, Pro, Thr, Glu, Arg, Trp,  
Gly, or Leu;
- Xaa at position 56 is Asn, Leu, Val, Trp, Pro, or Ala;
- Xaa at position 57 is Ala, Met, Leu, Pro, Arg, Glu, Thr,  
Gln, Trp, or Asn;
- 10 Xaa at position 58 is Ser, Glu, Met, Ala, His, Asn, Arg,  
or Asp;
- Xaa at position 59 is Ala, Glu, Asp, Leu, Ser, Gly, Thr,  
or Arg;
- Xaa at position 60 is Ile, Met, Thr, Pro, Arg, Gly, Ala;
- 15 Xaa at position 61 is Glu, Lys, Gly, Asp, Pro, Trp, Arg,  
Ser, Gln, or Leu;
- Xaa at position 62 is Ser, Val, Ala, Asn, Trp, Glu, Pro,  
Gly, or Asp;
- Xaa at position 63 is Ile, Ser, Arg, Thr, or Leu;
- 20 Xaa at position 64 is Leu, Ala, Ser, Glu, Phe, Gly, or  
Arg;
- Xaa at position 65 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
or Asp;
- Xaa at position 66 is Asn, Trp, Val, Gly, Thr, Leu, Glu,  
or Arg;
- 25 Xaa at position 67 is Leu, Gln, Gly, Ala, Trp, Arg, Val,  
or Lys;
- Xaa at position 68 is Leu, Gln, Lys, Trp, Arg, Asp, Glu,  
Asn, His, Thr, Ser, Ala, Tyr, Phe, Ile, Met or Val;
- 30 Xaa at position 69 is Pro, Ala, Thr, Trp, Arg, or Met;
- Xaa at position 70 is Cys, Glu, Gly, Arg, Met, or Val;
- Xaa at position 71 is Leu, Asn, Val, or Gln;
- Xaa at position 72 is Pro, Cys, Arg, Ala, or Lys;
- Xaa at position 73 is Leu, Ser, Trp, or Gly;
- 35 Xaa at position 74 is Ala, Lys, Arg, Val, or Trp;
- Xaa at position 75 is Thr, Asp, Cys, Leu, Val, Glu, His,

Asn, or Ser;  
Xaa at position 76 is Ala, Pro, Ser, Thr, Gly, Asp, Ile,  
or Met;  
Xaa at position 77 is Ala, Pro, Ser, Thr, Phe, Leu, Asp,  
5 or His;  
Xaa at position 78 is Pro, Phe, Arg, Ser, Lys, His, Ala,  
Gly, Ile or Leu;  
Xaa at position 79 is Thr, Asp, Ser, Asn, Pro, Ala, Leu,  
or Arg;  
10 Xaa at position 80 is Arg, Ile, Ser, Glu, Leu, Val, Gln,  
Lys, His, Ala or Pro;  
Xaa at position 81 is His, Gln, Pro, Arg, Val, Leu, Gly,  
Thr, Asn, Lys, Ser, Ala, Trp, Phe, Ile or Tyr;  
Xaa at position 82 is Pro, Lys, Tyr, Gly, Ile, or Thr;  
15 Xaa at position 83 is Ile, Val, Lys, Ala, or Asn;  
Xaa at position 84 is His, Ile, Asn, Leu, Asp, Ala, Thr,  
Glu, Gln, Ser, Phe, Met, Val, Lys, Arg, Tyr or Pro;  
Xaa at position 85 is Ile, Leu, Arg, Asp, Val, Pro, Gln,  
Gly, Ser, Phe, or His;  
20 Xaa at position 86 is Lys, Tyr, Leu, His, Arg, Ile, Ser,  
Gln, Pro;  
Xaa at position 87 is Asp, Pro, Met, Lys, His, Thr, Val,  
Tyr, Glu, Asn, Ser, Ala, Gly, Ile, Leu or Gln;  
Xaa at position 88 is Gly, Leu, Glu, Lys, Ser, Tyr, or  
25 Pro;  
Xaa at position 89 is Asp, or Ser;  
Xaa at position 90 is Trp, Val, Cys, Tyr, Thr, Met, Pro,  
Leu, Gln, Lys, Ala, Phe, or Gly;  
Xaa at position 91 is Asn, Pro, Ala, Phe, Ser, Trp, Gln,  
30 Tyr, Leu, Lys, Ile, Asp, or His;  
Xaa at position 92 is Glu, Ser, Ala, Lys, Thr, Ile, Gly,  
or Pro;  
Xaa at position 94 is Arg, Lys, Asp, Leu, Thr, Ile, Gln,  
His, Ser, Ala, or Pro;  
35 Xaa at position 95 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser,  
or Gly;

- Xaa at position 96 is Lys, Asn, Thr, Leu, Gln, Arg,  
His, Glu, Ser, Ala or Trp;
- Xaa at position 97 is Leu, Ile, Arg, Asp, or Met;
- Xaa at position 98 is Thr, Val, Gln, Tyr, Glu, His, Ser,  
5 or Phe;
- Xaa at position 99 is Phe, Ser, Cys, His, Gly, Trp, Tyr,  
Asp, Lys, Leu, Ile, Val or Asn;
- Xaa at position 100 is Tyr, Cys, His, Ser, Trp, Arg, or  
Leu;
- 10 Xaa at position 101 is Leu, Asn, Val, Pro, Arg, Ala, His,  
Thr, Trp, or Met;
- Xaa at position 102 is Lys, Leu, Pro, Thr, Met, Asp, Val,  
Glu, Arg, Trp, Ser, Asn, His, Ala, Tyr, Phe, Gln, or  
Ile;
- 15 Xaa at position 103 is Thr, Ser, Asn, Ile, Trp, Lys, or  
Pro;
- Xaa at position 104 is Leu, Ser, Pro, Ala, Glu, Cys, Asp,  
or Tyr;
- Xaa at position 105 is Glu, Ser, Lys, Pro, Leu, Thr, Tyr,  
20 or Arg;
- Xaa at position 106 is Asn, Ala, Pro, Leu, His, Val, or  
Gln;
- Xaa at position 107 is Ala, Ser, Ile, Asn, Pro, Lys, Asp,  
or Gly;
- 25 Xaa at position 108 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
His, Ile, Tyr, or Cys;
- Xaa at position 109 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
or Leu;
- 30 and which can additionally have Met- or Met-Ala- preceding  
the amino acid in position 1; and wherein from 4 to 44 of  
the amino acids designated by Xaa are different from the  
corresponding native amino acids of (1-133) human  
interleukin-3;
- 35 a colony stimulating factor selected from the group  
consisting of GM-CSF, CSF-1, G-CSF, Meg-CSF (more recently

referred to as c-mpl ligand), M-CSF, erythropoietin (EPO),  
IL-1, IL-4, IL-2, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-  
11, IL-12, IL-13, LIF, flt3/flk2, human growth hormone, B-  
cell growth factor, B-cell differentiation factor,  
5 eosinophil differentiation factor and stem cell factor  
(SCF); and

at least one non-toxic pharmaceutically acceptable  
carrier.

10 6. A composition of claim 5, wherein said human  
interleukin-3 mutant polypeptide is of the Formula:

Asn Cys Xaa Xaa Xaa Ile Xaa Glu Xaa Xaa Xaa Xaa Leu Lys Xaa			
1	5	10	15
Xaa Xaa Xaa Xaa Xaa Xaa Asp Xaa Xaa Asn Leu Asn Xaa Glu Xaa			
	20	25	30
Xaa Xaa Ile Leu Met Xaa Xaa Asn Leu Xaa Xaa Xaa Asn Leu Glu			
20	35	40	45
Xaa Phe Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Xaa Xaa Ile			
	50	55	60
25 Glu Xaa Xaa Leu Xaa Xaa Leu Xaa Xaa Cys Xaa Pro Xaa Xaa Thr			
	65	70	75
Ala Xaa Pro Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Asp Xaa			
	80	85	90
30 Xaa Xaa Phe Xaa Xaa Lys Leu Xaa Phe Xaa Xaa Xaa Xaa Leu Glu			
	95	100	105
35 Xaa Xaa Xaa Xaa Gln Gln [SEQ ID NO:5]			

wherein

- Xaa at position 3 is Ser, Gly, Asp, Met, or Gln;  
Xaa at position 4 is Asn, His, or Ile;  
5 Xaa at position 5 is Met or Ile;  
Xaa at position 7 is Asp or Glu;  
Xaa at position 9 is Ile, Ala, Leu, or Gly;  
Xaa at position 10 is Ile, Val, or Leu;  
Xaa at position 11 is Thr, His, Gln, or Ala;  
10 Xaa at position 12 is His or Ala;  
Xaa at position 15 is Gln, Asn, or Val;  
Xaa at position 16 is Pro, Gly, or Gln;  
Xaa at position 17 is Pro, Asp, Gly, or Gln;  
Xaa at position 18 is Leu, Arg, Gln, Asn, Gly, Ala, or  
15 Glu;  
Xaa at position 19 is Pro or Glu;  
Xaa at position 20 is Leu, Val, Gly, Ser, Lys, Ala, Arg,  
Gln, Glu, Ile, Phe, Thr or Met;  
Xaa at position 21 is Leu, Ala, Asn, Pro, Gln, or Val;  
20 Xaa at position 23 is Phe, Ser, Pro, or Trp;  
Xaa at position 24 is Asn or Ala;  
Xaa at position 28 is Gly, Asp, Ser, Cys, Ala, Asn, Ile,  
Leu, Met Tyr or Arg;  
Xaa at position 30 is Asp or Glu;  
25 Xaa at position 31 is Gln, Val, Met, Leu, Thr, Ala, Asn,  
Glu, Ser or Lys;  
Xaa at position 32 is Asp, Phe, Ser, Thr, Ala, Asn, Gln,  
Glu, His, Ile, Lys, Tyr, Val or Cys;  
Xaa at position 36 is Glu, Ala, Asn, Ser or Asp;  
30 Xaa at position 37 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 40 is Arg or Ala;  
Xaa at position 41 is Arg, Thr, Val, Leu, or Gly;  
Xaa at position 42 is Pro, Gly, Ser, Gln, Ala, Arg, Asn,  
35 Glu, Leu, Thr, Val or Lys;  
Xaa at position 46 is Ala or Ser;

- Xaa at position 48 is Asn, Pro, Thr, or Ile;  
Xaa at position 49 is Arg or Lys;  
Xaa at position 50 is Ala or Asn;  
Xaa at position 51 is Val or Thr;  
5 Xaa at position 52 is Lys or Arg;  
Xaa at position 53 is Ser, Phe, or His;  
Xaa at position 54 is Leu, Ile, Phe, or His;  
Xaa at position 55 is Gln, Ala, Pro, Thr, Glu, Arg, or  
Gly;  
10 Xaa at position 57 is Ala, Pro, or Arg;  
Xaa at position 58 is Ser, Glu, Arg, or Asp;  
Xaa at position 59 is Ala or Leu;  
Xaa at position 62 is Ser, Val, Ala, Asn, Glu, Pro, or  
Gly;  
15 Xaa at position 63 is Ile or Leu;  
Xaa at position 65 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
Gly, or Asp;  
Xaa at position 66 is Asn, Gly, Glu, or Arg;  
Xaa at position 68 is Leu, Gln, Trp, Arg, Asp, Ala, Asn,  
20 Glu, His, Ile, Met, Phe, Ser, Thr, Tyr or Val;  
Xaa at position 69 is Pro or Thr;  
Xaa at position 71 is Leu or Val;  
Xaa at position 73 is Leu or Ser;  
Xaa at position 74 is Ala or Trp;  
25 Xaa at position 77 is Ala or Pro;  
Xaa at position 79 is Thr, Asp, Ser, Pro, Ala, Leu, or  
Arg;  
Xaa at position 81 is His, Pro, Arg, Val, Leu, Gly, Asn,  
Phe, Ser or Thr;  
30 Xaa at position 82 is Pro or Tyr;  
Xaa at position 83 is Ile or Val;  
Xaa at position 84 is His, Ile, Asn, Leu, Ala, Thr, Leu,  
Arg, Gln, Leu, Lys, Met, Ser, Tyr, Val or Pro;  
Xaa at position 85 is Ile, Leu, or Val;  
35 Xaa at position 86 is Lys, Arg, Ile, Gln, Pro, or Ser;  
Xaa at position 87 is Asp, Pro, Met, Lys, His, Thr, Asn,

Ile, Leu or Tyr;  
 Xaa at position 90 is Trp or Leu;  
 Xaa at position 91 is Asn, Pro, Ala, Ser, Trp, Gln, Tyr,  
 Leu, Lys, Ile, Asp, or His;  
 5 Xaa at position 92 is Glu, or Gly;  
 Xaa at position 94 is Arg, Ala, or Ser;  
 Xaa at position 95 is Arg, Thr, Glu, Leu, or Ser;  
 Xaa at position 98 is Thr, Val, or Gln;  
 Xaa at position 100 is Tyr or Trp;  
 10 Xaa at position 101 is Leu or Ala;  
 Xaa at position 102 is Lys, Thr, Val, Trp, Ser, Ala, His,  
 Met, Phe, Tyr or Ile;  
 Xaa at position 103 is Thr or Ser;  
 Xaa at position 106 is Asn, Pro, Leu, His, Val, or Gln;  
 15 Xaa at position 107 is Ala, Ser, Ile, Asn, Pro, Asp, or  
 Gly;  
 Xaa at position 108 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
 His, Ile, Tyr, or Cys;  
 Xaa at position 109 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
 20 or Leu;

which can additionally have Met- or Met-Ala- preceding the  
 amino acid in position 1; and wherein from 4 to 35 of the  
 amino acids designated by Xaa are different from the  
 25 corresponding amino acids of native human interleukin-3.

7. A composition of claim 6, wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

30 Asn Cys Xaa Xaa Met Ile Asp Glu Xaa Ile Xaa Xaa Leu Lys Xaa  
 1 5 10 15

Xaa Pro Xaa Pro Xaa Xaa Asp Phe Xaa Asn Leu Asn Xaa Glu Asp  
 20 25 30

35 Xaa Xaa Ile Leu Met Xaa Xaa Asn Leu Arg Xaa Xaa Asn Leu Glu



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	35	40	45
	Ala Phe Xaa Arg Xaa Xaa Lys Xaa Xaa Xaa Asn Ala Ser Ala Ile		
	50	55	60
5	Glu Xaa Xaa Leu Xaa Xaa Leu Xaa Pro Cys Leu Pro Xaa Xaa Thr		
	65	70	75
	Ala Xaa Pro Xaa Arg Xaa Pro Ile Xaa Xaa Xaa Xaa Gly Asp Trp		
10	80	85	90
	Xaa Glu Phe Xaa Xaa Lys Leu Xaa Phe Tyr Leu Xaa Xaa Leu Glu		
	95	100	105
15	Xaa Xaa Xaa Xaa Gln Gln [SEQ ID NO:6]		
	110		

wherein

- Xaa at position 3 is Ser, Gly, Asp, or Gln;
- 20 Xaa at position 4 is Asn, His, or Ile;
- Xaa at position 9 is Ile, Ala, Leu, or Gly;
- Xaa at position 11 is Thr, His, or Gln;
- Xaa at position 12 is His or Ala;
- Xaa at position 15 is Gln or Asn;
- 25 Xaa at position 16 is Pro or Gly;
- Xaa at position 18 is Leu, Arg, Asn, or Ala;
- Xaa at position 20 is Leu, Val, Ser, Ala, Arg, Gln, Glu, Ile, Phe, Thr or Met;
- Xaa at position 21 is Leu, Ala, Asn, or Pro;
- 30 Xaa at position 24 is Asn or Ala;
- Xaa at position 28 is Gly, Asp, Ser, Ala, Asn, Ile, Leu, Met, Tyr or Arg;
- Xaa at position 31 is Gln, Val, Met, Leu, Ala, Asn, Glu or Lys;
- 35 Xaa at position 32 is Asp, Phe, Ser, Ala, Gln, Glu, His, Val or Thr;

- Xaa at position 36 is Glu, Asn, Ser or Asp;  
Xaa at position 37 is Asn, Arg, Pro, Thr, or His;  
Xaa at position 41 is Arg, Leu, or Gly;  
Xaa at position 42 is Pro, Gly, Ser, Ala, Asn, Val, Leu or  
5 Gln;  
Xaa at position 48 is Asn, Pro, or Thr;  
Xaa at position 50 is Ala or Asn;  
Xaa at position 51 is Val or Thr;  
Xaa at position 53 is Ser or Phe;  
10 Xaa at position 54 is Leu or Phe;  
Xaa at position 55 is Gln, Ala, Glu, or Arg;  
Xaa at position 62 is Ser, Val, Asn, Pro, or Gly;  
Xaa at position 63 is Ile or Leu;  
Xaa at position 65 is Lys, Asn, Met, Arg, Ile, or Gly;  
15 Xaa at position 66 is Asn, Gly, Glu, or Arg;  
Xaa at position 68 is Leu, Gln, Trp, Arg, Asp, Asn, Glu,  
His, Met, Phe, Ser, Thr, Tyr or Val;  
Xaa at position 73 is Leu or Ser;  
Xaa at position 74 is Ala or Trp;  
20 Xaa at position 77 is Ala or Pro;  
Xaa at position 79 is Thr, Asp, or Ala;  
Xaa at position 81 is His, Pro, Arg, Val, Gly, Asn, Ser or  
Thr;  
Xaa at position 84 is His, Ile, Asn, Ala, Thr, Arg, Gln,  
25 Glu, Lys, Met, Ser, Tyr, Val or Leu;  
Xaa at position 85 is Ile or Leu;  
Xaa at position 86 is Lys or Arg;  
Xaa at position 87 is Asp, Pro, Met, Lys, His, Pro, Asn,  
Ile, Leu or Tyr;  
30 Xaa at position 91 is Asn, Pro, Ser, Ile or Asp;  
Xaa at position 94 is Arg, Ala, or Ser;  
Xaa at position 95 is Arg, Thr, Glu, Leu, or Ser;  
Xaa at position 98 is Thr or Gln;  
Xaa at position 102 is Lys, Val, Trp, or Ile;  
35 Xaa at position 103 is Thr, Ala, His, Phe, Tyr or Ser;  
Xaa at position 106 is Asn, Pro, Leu, His, Val, or Gln;

Xaa at position 107 is Ala, Ser, Ile, Pro, or Asp;  
Xaa at position 108 is Gln, Met, Trp, Phe, Pro, His, Ile,  
or Tyr;  
Xaa at position 109 is Ala, Met, Glu, Ser, or Leu;

5 and which can additionally have Met- or Met-Ala- preceding  
the amino acid in position 1; and wherein from 4 to 26 of  
the amino acids designated by Xaa are different from the  
corresponding amino acids of native (1-133)human

10 interleukin-3.

8. The composition of claim 7, wherein said human  
interleukin-3 mutant polypeptide is of the Formula:

15 Xaa at position 17 is Ser, Lys, Asp, Met, Gln, or Arg;  
Xaa at position 18 is Asn, His, Leu, Ile, Phe, Arg, or  
Gln;  
Xaa at position 19 is Met, Arg, Gly, Ala, or Cys;

20 Xaa at position 20 is Ile, Cys, Gln, Glu, Arg, Pro, or  
Ala;  
Xaa at position 21 is Asp, Phe, Lys, Arg, Ala, Gly, or  
Val;  
Xaa at position 22 is Glu, Trp, Pro, Ser, Ala, His, or

25 Gly;  
Xaa at position 23 is Ile, Ala, Gly, Trp, Lys, Leu, Ser,  
or Arg;  
Xaa at position 24 is Ile, Gly, Arg, or Ser;  
Xaa at position 25 is Thr, His, Gly, Gln, Arg, Pro, or

30 Ala;  
Xaa at position 26 is His, Thr, Phe, Gly, Ala, or Trp;  
Xaa at position 27 is Leu, Gly, Arg, Thr, Ser, or Ala;  
Xaa at position 28 is Lys, Leu, Gln, Gly, Pro, Val or Trp;  
Xaa at position 29 is Gln, Asn, Pro, Arg, or Val;

35 Xaa at position 30 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
Leu, or Lys;

- Xaa at position 31 is Pro, Asp, Gly, Arg, Leu, or Gln;  
Xaa at position 32 is Leu, Arg, Gln, Asn, Gly, Ala, or  
Glu;  
Xaa at position 33 is Pro, Leu, Gln, Thr, or Glu;  
5 Xaa at position 34 is Leu, Gly, Ser, or Lys;  
Xaa at position 35 is Leu, Ala, Gly, Asn, Pro, or Gln;  
Xaa at position 36 is Asp, Leu, or Val;  
Xaa at position 37 is Phe, Ser, or Pro;  
Xaa at position 38 is Asn, or Ala;  
10 Xaa at position 40 is Leu, Trp, or Arg;  
Xaa at position 41 is Asn, Cys, Arg, Leu, His, Met, Pro;  
Xaa at position 42 is Gly, Asp, Ser, Cys, or Ala;  
Xaa at position 42 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
Cys, or Ser;  
15 Xaa at position 44 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
Trp, or Pro;  
Xaa at position 45 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
Lys, or Trp;  
Xaa at position 46 is Asp, Phe, Ser, Thr, Cys, or Gly;  
20 Xaa at position 47 is Ile, Gly, Ser, Arg, Pro, or His;  
Xaa at position 48 is Leu, Ser, Cys, Arg, His, Phe, or  
Asn;  
Xaa at position 49 is Met, Arg, Ala, Gly, Pro, Asn, His,  
or Asp;  
25 Xaa at position 50 is Glu, Leu, Thr, Asp, or Tyr;  
Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 52 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;  
30 Xaa at position 53 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
Ser, or;  
Xaa at position 54 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
or Leu;  
Xaa at position 55 is Arg, Thr, Val, Ser, Leu, or Gly;  
35 Xaa at position 56 is Pro, Gly, Cys, Ser, Gln, or Lys;  
Xaa at position 57 is Asn or Gly;

- Xaa at position 58 is Leu, Ser, Asp, Arg, Gln, Val, or Cys;
- Xaa at position 59 is Glu Tyr, His, Leu, Pro, or Arg;
- Xaa at position 60 is Ala, Ser, Tyr, Asn, or Thr;
- 5 Xaa at position 61 is Phe, Asn, Glu, Pro, Lys, Arg, or Ser;
- Xaa at position 62 is Asn His, Val, Arg, Pro, Thr, or Ile;
- Xaa at position 63 is Arg, Tyr, Trp, Ser, Pro, or Val;
- Xaa at position 64 is Ala, Asn, Ser, or Lys;
- 10 Xaa at position 65 is Val, Thr, Pro, His, Leu, Phe, or Ser;
- Xaa at position 66 is Lys, Ile, Val, Asn, Glu, or Ser;
- Xaa at position 67 is Ser, Ala, Phe, Val, Gly, Asn, Ile, Pro, or His;
- 15 Xaa at position 68 is Leu, Val, Trp, Ser, Thr, or His;
- Xaa at position 69 is Gln, Ala, Pro, Thr, Arg, Trp, Gly, or Leu;
- Xaa at position 70 is Asn, Leu, Val, Trp, Pro, or Ala;
- Xaa at position 71 is Ala, Met, Leu, Arg, Glu, Thr, Gln, Trp, or Asn;
- 20 Xaa at position 72 is Ser, Glu, Met, Ala, His, Asn, Arg, or Asp;
- Xaa at position 73 is Ala, Glu, Asp, Leu, Ser, Gly, Thr, or Arg;
- 25 Xaa at position 74 is Ile, Thr, Pro, Arg, Gly, Ala;
- Xaa at position 75 is Glu, Lys, Gly, Asp, Pro, Trp, Arg, Ser, or Leu;
- Xaa at position 76 is Ser, Val, Ala, Asn, Trp, Glu, Pro, Gly, or Asp;
- 30 Xaa at position 77 is Ile, Ser, Arg, or Thr;
- Xaa at position 78 is Leu, Ala, Ser, Glu, Gly, or Arg;
- Xaa at position 79 is Lys, Thr, Gly, Asn, Met, Ile, or Asp;
- Xaa at position 80 is Asn, Trp, Val, Gly, Thr, Leu, or Arg;
- 35 Xaa at position 81 is Leu, Gln, Gly, Ala, Trp, Arg, or

Lys;

Xaa at position 82 is Leu, Gln, Lys, Trp, Arg, or Asp;

Xaa at position 83 is Pro, Thr, Trp, Arg, or Met;

Xaa at position 84 is Cys, Glu, Gly, Arg, Met, or Val;

5 Xaa at position 85 is Leu, Asn, or Gln;

Xaa at position 86 is Pro, Cys, Arg, Ala, or Lys;

Xaa at position 87 is Leu, Ser, Trp, or Gly;

Xaa at position 88 is Ala, Lys, Arg, Val, or Trp;

Xaa at position 89 is Thr, Asp, Cys, Leu, Val, Glu, His,

10 or Asn;

Xaa at position 90 is Ala, Ser, Asp, Ile, or Met;

Xaa at position 91 is Ala, Ser, Thr, Phe, Leu, Asp, or His;

Xaa at position 92 is Pro, Phe, Arg, Ser, Lys, His, or

15 Leu;

Xaa at position 93 is Thr, Asp, Ser, Asn, Pro, Ala, Leu, or Arg;

Xaa at position 94 is Arg, Ile, Ser, Glu, Leu, Val, or Pro;

20 Xaa at position 95 is His, Gln, Pro, Val, Leu, Thr or Tyr;

Xaa at position 96 is Pro, Lys, Tyr, Gly, Ile, or Thr;

Xaa at position 97 is Ile, Lys, Ala, or Asn;

Xaa at position 98 is His, Ile, Asn, Leu, Asp, Ala, Thr, or Pro;

25 Xaa at position 99 is Ile, Arg, Asp, Pro, Gln, Gly, Phe, or His;

Xaa at position 100 is Lys, Tyr, Leu, His, Ile, Ser, Gln, or Pro;

Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Val,

30 Tyr, or Gln;

Xaa at position 102 is Gly, Leu, Glu, Lys, Ser, Tyr, or Pro;

Xaa at position 103 is Asp, or Ser;

Xaa at position 104 is Trp, Val, Cys, Tyr, Thr, Met, Pro,

35 Leu, Gln, Lys, Ala, Phe, or Gly;

Xaa at position 105 is Asn, Pro, Ala, Phe, Ser, Trp, Gln,

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Tyr, Leu, Lys, Ile, or His;  
 Xaa at position 106 is Glu, Ser, Ala, Lys, Thr, Ile, Gly,  
 or Pro;  
 Xaa at position 108 is Arg, Asp, Leu, Thr, Ile, or Pro;  
 5 Xaa at position 109 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser,  
 or Gly.

9. A composition of claim 8, wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

10

	1	5	10
	(Met) <sub>m</sub> -Ala	Pro Met Thr Gln Thr Thr Ser Leu Lys Thr	
	15	20	
	Ser Trp Val Asn Cys Ser Xaa Xaa Xaa Asp Glu Ile Ile		
15	25	30	35
	Xaa His Leu Lys Xaa Pro Pro Xaa Pro Xaa Leu Asp Xaa		
	40	45	50
	Xaa Asn Leu Asn Xaa Glu Asp Xaa Asp Ile Leu Xaa Glu		
	55	60	
20	Xaa Asn Leu Arg Xaa Xaa Asn Leu Xaa Xaa Phe Xaa Xaa		
	65	70	75
	Ala Xaa Lys Xaa Leu Xaa Asn Ala Ser Xaa Ile Glu Xaa		
	80	85	
	Ile Leu Xaa Asn Leu Xaa Pro Cys Xaa Pro Xaa Xaa Thr		
25	90	95	100
	Ala Xaa Pro Xaa Arg Xaa Pro Ile Xaa Ile Xaa Xaa Gly		
	105	110	115
	Asp Trp Xaa Glu Phe Arg Xaa Lys Leu Xaa Phe Tyr Leu		
	120	125	
30	Xaa Xaa Leu Glu Xaa Ala Gln Xaa Gln Gln Thr Thr Leu		
	130		
	Ser Leu Ala Ile Phe [SEQ ID NO:7]		

wherein m is 0 or 1; Xaa at position 18 is Asn or Ile; Xaa  
 35 at position 19 is Met, Ala or Ile; Xaa at position 20 is  
 Ile, Pro or Ile; Xaa at position 23 is Ile, Ala or Leu; Xaa

at position 25 is Thr or His; Xaa at position 29 is Gln,  
 Arg, Val or Ile; Xaa at position 32 is Leu, Ala, Asn or  
 Arg; Xaa at position 34 is Leu or Ser; Xaa at position 37  
 is Phe, Pro, or Ser; Xaa at position 38 is Asn or Ala; Xaa  
 5 at position 42 is Gly, Ala, Ser, Asp or Asn; Xaa at  
 position 45 is Gln, Val, or Met; Xaa at position 46 is Asp  
 or Ser; Xaa at position 49 is Met, Ile, Leu or Asp; Xaa at  
 position 50 is Glu or Asp; Xaa at position 51 is Asn Arg or  
 Ser; Xaa at position 55 is Arg, Leu, or Thr; Xaa at  
 10 position 56 is Pro or Ser; Xaa at position 59 is Glu or  
 Leu; Xaa at position 60 is Ala or Ser; Xaa at position 62  
 is Asn, Val or Pro; Xaa at position 63 is Arg or His; Xaa  
 at position 65 is Val or Ser; Xaa at position 67 is Ser,  
 Asn, His or Gln; Xaa at position 69 is Gln or Glu; Xaa at  
 15 position 73 is Ala or Gly; Xaa at position 76 is Ser, Ala  
 or Pro; Xaa at position 79 is Lys, Arg or Ser; Xaa at  
 position 82 is Leu, Glu, Val or Trp; Xaa at position 85 is  
 Leu or Val; Xaa at position 87 is Leu, Ser, Tyr; Xaa at  
 position 88 is Ala or Trp; Xaa at position 91 is Ala or  
 20 Pro; Xaa at position 93 is Pro or Ser; Xaa at position 95  
 is His or Thr; Xaa at position 98 is His, Ile, or Thr; Xaa  
 at position 100 is Lys or Arg; Xaa at position 101 is Asp,  
 Ala or Met; Xaa at position 105 is Asn or Glu; Xaa at  
 position 109 is Arg, Glu or Leu; Xaa at position 112 is Thr  
 25 or Gln; Xaa at position 116 is Lys, Val, Trp or Ser; Xaa at  
 position 117 is Thr or Ser; Xaa at position 120 is Asn,  
 Gln, or His; Xaa at position 123 is Ala or Glu; with the  
 proviso that from four to forty-four of the amino acids  
 designated by Xaa are different from the corresponding  
 30 amino acids of native human interleukin-3.

10. The composition of claim 9, wherein said  
 human interleukin-3 mutant polypeptide is of the Formula:

35                    1                    5                    10  
 (Met<sub>m</sub>-Ala<sub>n</sub>)<sub>p</sub>-Asn Cys Ser Xaa Xaa Xaa Asp Glu Xaa Ile



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15 20  
Xaa His Leu Lys Xaa Pro Pro Xaa Pro Xaa Leu Asp Xaa  
25 30 35  
Xaa Asn Leu Asn Xaa Glu Asp Xaa Xaa Ile Leu Xaa Glu  
5

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	40		45
	Xaa Asn Leu Arg Xaa Xaa Asn Leu Xaa Xaa Phe Xaa Xaa		
	50	55	60
	Ala Xaa Lys Xaa Leu Xaa Asn Ala Ser Xaa Ile Glu Xaa		
5	65	70	75
	Ile Leu Xaa Asn Xaa Xaa Pro Cys Xaa Pro Xaa Ala Thr		
	80	85	
	Ala Xaa Pro Xaa Arg Xaa Pro Ile Xaa Ile Xaa Xaa Gly		
	90	95	100
10	Asp Trp Xaa Glu Phe Arg Xaa Lys Leu Xaa Phe Tyr Leu		
	105	110	
	Xaa Xaa Leu Glu Xaa Ala Gln Xaa Gln Gln [SEQ ID NO:8]		

wherein m is 0 or 1; n is 0 or 1; p is 0 or 1; Xaa at  
15 position 4 is Asn or Ile; Xaa at position 5 is Met, Ala or  
Ile; Xaa at position 6 is Ile, Pro or Leu; Xaa at position  
9 is Ile, Ala or Leu; Xaa at position 11 is Thr or His; Xaa  
at position 15 is Gln, Arg, Val or Ile; Xaa at position 18  
is Leu, Ala, Asn or Arg; Xaa at position 20 is Leu or Ser;  
20 Xaa at position 23 is Phe, Pro, or Ser; Xaa at position 24  
is Asn or Ala; Xaa at position 28 is Gly, Ala, Ser, Asp or  
Asn; Xaa at position 31 is Gln, Val, or Met; Xaa at  
position 32 is Asp or Ser; Xaa at position 35 is Met, Ile  
or Asp; Xaa at position 36 is Glu or Asp; Xaa at position  
25 37 is Asn, Arg or Ser; Xaa at position 41 is Arg, Leu, or  
Thr; Xaa at position 42 is Pro or Ser; Xaa at position 45  
is Glu or Leu; Xaa at position 46 is Ala or Ser; Xaa at  
position 48 is Asn, Val or Pro; Xaa at position 49 is Arg  
or His; Xaa at position 51 is Val or Ser; Xaa at position  
30 53 is Ser, Asn, His or Gln; Xaa at position 55 is Gln or  
Glu; Xaa at position 59 is Ala or Gly; Xaa at position 62  
is Ser, Ala or Pro; Xaa at position 65 is Lys, Arg or Ser;  
Xaa at position 67 is Leu, Glu, or Val; Xaa at position 68  
is Leu, Glu, Val or Trp; Xaa at position 71 is Leu or Val;  
35 Xaa at position 73 is Leu, Ser or Tyr; Xaa at position 74  
is Ala or Trp; Xaa at position 77 is Ala or Pro; Xaa at

position 79 is Pro or Ser; Xaa at position 81 is His or Thr; Xaa at position 84 is His, Ile, or Thr; Xaa at position 86 is Lys or Arg; Xaa at position 87 is Asp, Ala or Met; Xaa at position 91 is Asn or Glu; Xaa at position 5 95 is Arg, Glu, Leu; Xaa at position 98 Thr or Gln; Xaa at position 102 is Lys, Val, Trp or Ser; Xaa at position 103 is Thr or Ser; Xaa at position 106 is Asn, Gln, or His; Xaa at position 109 is Ala or Glu; with the proviso that from 10 four to forty-four of the amino acids designated by Xaa are different from the corresponding amino acids of native (15-125)human interleukin-3.

11. The composition of claim 10, wherein said human interleukin-3 mutant polypeptide is of the Formula:

15

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
Glu Asp Val Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
20 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:9];

25

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:10];

35

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn

Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
5 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:11];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
10 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:12];

15 Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
20 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:13];

25 Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:14];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
35 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn

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Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
5 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:15];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
10 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:16];

15

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
20 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:17];

25

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:18];

35

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn

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Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
5 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:19];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
10 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:20];

15 Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
20 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:21];

25 Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:22];

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
35 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn

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Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
5 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:23];

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
10 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:24];

15 Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
20 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:25];

25 Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
30 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:26];

Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
35 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn

Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 5 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:27];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 10 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:28];

15 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 20 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:29];

25 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:30];

35 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn



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Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
5 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:31];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
10 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:32];

15 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
20 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:33];

25 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
30 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:34];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
35 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn

Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 5 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:35];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 10 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:36];

15 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 20 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:37];

25 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 30 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:38];

35 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn

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Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 5 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:39].

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile  
 His His Leu Lys Arg Pro Pro Ala Pro Leu Leu Asp  
 10 Pro Asn Asn Leu Asn Ala Glu Asp Val Asp Ile Leu Met Asp Arg  
 Asn Leu Arg Leu Ser Asn Leu Glu Ser Phe Val Arg Ala Val Lys  
 Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:40]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ala Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Ser Leu Asp Pro Asn Asn Leu Asn Asp  
 20 Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 25 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:41]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
 Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 30 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:42]

35

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala

Glu Asp Val Asp Ile Leu Met Asp Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 5 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:43]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 10 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
 Glu Asp Val Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:44]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 20 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
 Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 25 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:45]

Met Ala Tyr Pro Glu Thr Asp Tyr Lys Asp Asp Asp Asp Lys Asn  
 Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu Lys Arg Pro  
 30 Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala Glu Asp Val  
 Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn Leu Glu Ser  
 Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser Gly Ile Glu  
 Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser Ala Thr Ala  
 Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly Asp Trp Gln  
 35 Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr Leu Glu Gln  
 Ala Gln Glu Gln Gln [SEQ ID NO:46]and

Met Ala Tyr Pro Glu Thr Asp Tyr Lys Asp Asp Asp Asp Lys Asn  
 Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu Lys Arg Pro  
 5 Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser Glu Asp Met  
 Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn Leu Leu Ala  
 Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser Gly Ile Glu  
 Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser Ala Thr Ala  
 Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly Asp Trp Gln  
 10 Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr Leu Glu Gln  
 Ala Gln Glu Gln Gln [SEQ ID NO:47].

12. The composition of claim 10, wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

15 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Leu Ile His His Leu  
 Lys Ile Pro Pro Asn Pro Ser Leu Asp Ser Ala Asn Leu Asn Ser  
 Glu Asp Val Ser Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 20 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:48].

25 13. The composition of claim 1-12 wherein said CSF is  
 selected from the group consisting of G-CSF , Meg-CSF and GM-CSF:

14. A method of increasing multi-lineage  
 30 hematopoietic cell production in a mammal in need thereof  
 comprising administering a pharmaceutically effective  
 amount of a human interleukin-3 mutant polypeptide of the  
 Formula:

35 Ala Pro Met Thr Gln Thr Thr Ser Leu Lys Thr Ser Trp Val Asn  
 1 5 10 15

[illegible]

Xaa at position 17 is Ser, Lys, Gly, Asp, Met, Gln, or Arg;

30 Xaa at position 18 is Asn, His, Leu, Ile, Phe, Arg, or Gln;

Xaa at position 19 is Met, Phe, Ile, Arg, Gly, Ala, or Cys;

Xaa at position 20 is Ile, Cys, Gln, Glu, Arg, Pro, or

35 Ala;

Xaa at position 21 is Asp, Phe, Lys, Arg, Ala, Gly, Glu,

- Gln, Asn, Thr, Ser or Val;  
Xaa at position 22 is Glu, Trp, Pro, Ser, Ala, His, Asp,  
Asn, Gln, Leu, Val or Gly;  
Xaa at position 23 is Ile, Val, Ala, Leu, Gly, Trp, Lys,  
5 Phe, Leu, Ser, or Arg;  
Xaa at position 24 is Ile, Gly, Val, Arg, Ser, Phe, or  
Leu;  
Xaa at position 25 is Thr, His, Gly, Gln, Arg, Pro, or  
Ala;  
10 Xaa at position 26 is His, Thr, Phe, Gly, Arg, Ala, or  
Trp;  
Xaa at position 27 is Leu, Gly, Arg, Thr, Ser, or Ala;  
Xaa at position 28 is Lys, Arg, Leu, Gln, Gly, Pro, Val or  
Trp;  
15 Xaa at position 29 is Gln, Asn, Leu, Pro, Arg, or Val;  
Xaa at position 30 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
Leu, or Lys;  
Xaa at position 31 is Pro, Asp, Gly, Ala, Arg, Leu, or  
Gln;  
20 Xaa at position 32 is Leu, Val, Arg, Gln, Asn, Gly, Ala,  
or Glu;  
Xaa at position 33 is Pro, Leu, Gln, Ala, Thr, or Glu;  
Xaa at position 34 is Leu, Val, Gly, Ser, Lys, Glu, Gln,  
Thr, Arg, Ala, Phe, Ile or Met;  
25 Xaa at position 35 is Leu, Ala, Gly, Asn, Pro, Gln, or  
Val;  
Xaa at position 36 is Asp, Leu, or Val;  
Xaa at position 37 is Phe, Ser, Pro, Trp, or Ile;  
Xaa at position 38 is Asn, or Ala;  
30 Xaa at position 40 is Leu, Trp, or Arg;  
Xaa at position 41 is Asn, Cys, Arg, Leu, His, Met, or  
Pro;  
Xaa at position 42 is Gly, Asp, Ser, Cys, Asn, Lys, Thr,  
Leu, Val, Glu, Phe, Tyr, Ile, Met or Ala;  
35 Xaa at position 43 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
Cys, Gln, Arg, Thr, Gly or Ser;

- Xaa at position 44 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
Trp, Glu, Asn, Gln, Ala or Pro;
- Xaa at position 45 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
Lys, Trp, Asp, Asn, Arg, Ser, Ala, Ile, Glu or His;
- 5 Xaa at position 46 is Asp, Phe, Ser, Thr, Cys, Glu, Asn,  
Gln, Lys, His, Ala, Tyr, Ile, Val or Gly;
- Xaa at position 47 is Ile, Gly, Val, Ser, Arg, Pro, or  
His;
- Xaa at position 48 is Leu, Ser, Cys, Arg, Ile, His, Phe,  
10 Glu, Lys, Thr, Ala, Met, Val or Asn;
- Xaa at position 49 is Met, Arg, Ala, Gly, Pro, Asn, His,  
or Asp;
- Xaa at position 50 is Glu, Leu, Thr, Asp, Tyr, Lys, Asn,  
Ser, Ala, Ile, Val, His, Phe, Met or Gln;
- 15 Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;
- Xaa at position 52 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;
- Xaa at position 53 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
20 Ser, or Met;
- Xaa at position 54 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
Asn, Lys, His, Ala or Leu;
- Xaa at position 55 is Arg, Thr, Val, Ser, Leu, or Gly;
- Xaa at position 56 is Pro, Gly, Cys, Ser, Gln, Glu, Arg,  
25 His, Thr, Ala, Tyr, Phe, Leu, Val or Lys;
- Xaa at position 57 is Asn or Gly;
- Xaa at position 58 is Leu, Ser, Asp, Arg, Gln, Val, or  
Cys;
- Xaa at position 59 is Glu Tyr, His, Leu, Pro, or Arg;
- 30 Xaa at position 60 is Ala, Ser, Pro, Tyr, Asn, or Thr;
- Xaa at position 61 is Phe, Asn, Glu, Pro, Lys, Arg, or  
Ser;
- Xaa at position 62 is Asn His, Val, Arg, Pro, Thr, Asp, or  
Ile;
- 35 Xaa at position 63 is Arg, Tyr, Trp, Lys, Ser, His, Pro,  
or Val;



- Xaa at position 64 is Ala, Asn, Pro, Ser, or Lys;  
Xaa at position 65 is Val, Thr, Pro, His, Leu, Phe, or  
Ser;  
Xaa at position 66 is Lys, Ile, Arg, Val, Asn, Glu, or  
5 Ser;  
Xaa at position 67 is Ser, Ala, Phe, Val, Gly, Asn, Ile,  
Pro, or His;  
Xaa at position 68 is Leu, Val, Trp, Ser, Ile, Phe, Thr,  
or His;  
10 Xaa at position 69 is Gln, Ala, Pro, Thr, Glu, Arg, Trp,  
Gly, or Leu;  
Xaa at position 70 is Asn, Leu, Val, Trp, Pro, or Ala;  
Xaa at position 71 is Ala, Met, Leu, Pro, Arg, Glu, Thr,  
Gln, Trp, or Asn;  
15 Xaa at position 72 is Ser, Glu, Met, Ala, His, Asn, Arg,  
or Asp;  
Xaa at position 73 is Ala, Glu, Asp, Leu, Ser, Gly, Thr,  
or Arg;  
Xaa at position 74 is Ile, Met, Thr, Pro, Arg, Gly, Ala;  
20 Xaa at position 75 is Glu, Lys, Gly, Asp, Pro, Trp, Arg,  
Ser, Gln, or Leu;  
Xaa at position 76 is Ser, Val, Ala, Asn, Trp, Glu, Pro,  
Gly, or Asp;  
Xaa at position 77 is Ile, Ser, Arg, Thr, or Leu;  
25 Xaa at position 78 is Leu, Ala, Ser, Glu, Phe, Gly, or  
Arg;  
Xaa at position 79 is Lys, Thr, Asn, Met, Arg, Ile, Gly,  
or Asp;  
Xaa at position 80 is Asn, Trp, Val, Gly, Thr, Leu, Glu,  
30 or Arg;  
Xaa at position 81 is Leu, Gln, Gly, Ala, Trp, Arg, Val,  
or Lys;  
Xaa at position 82 is Leu, Gln, Lys, Trp, Arg, Asp, Glu,  
Asn, His, Thr, Ser, Ala, Tyr, Phe, Ile, Met or Val;  
35 Xaa at position 83 is Pro, Ala, Thr, Trp, Arg, or Met;  
Xaa at position 84 is Cys, Glu, Gly, Arg, Met, or Val;

Xaa at position 85 is Leu, Asn, Val, or Gln;  
Xaa at position 86 is Pro, Cys, Arg, Ala, or Lys;  
Xaa at position 87 is Leu, Ser, Trp, or Gly;  
Xaa at position 88 is Ala, Lys, Arg, Val, or Trp;  
5 Xaa at position 89 is Thr, Asp, Cys, Leu, Val, Glu, His,  
Asn, or Ser;  
Xaa at position 90 is Ala, Pro, Ser, Thr, Gly, Asp, Ile,  
or Met;  
Xaa at position 91 is Ala, Pro, Ser, Thr, Phe, Leu, Asp,  
10 or His;  
Xaa at position 92 is Pro, Phe, Arg, Ser, Lys, His, Ala,  
Gly, Ile or Leu;  
Xaa at position 93 is Thr, Asp, Ser, Asn, Pro, Ala, Leu,  
or Arg;  
15 Xaa at position 94 is Arg, Ile, Ser, Glu, Leu, Val, Gln,  
Lys, His, Ala, or Pro;  
Xaa at position 95 is His, Gln, Pro, Arg, Val, Leu, Gly,  
Thr, Asn, Lys, Ser, Ala, Trp, Phe, Ile, or Tyr;  
Xaa at position 96 is Pro, Lys, Tyr, Gly, Ile, or Thr;  
20 Xaa at position 97 is Ile, Val, Lys, Ala, or Asn;  
Xaa at position 98 is His, Ile, Asn, Leu, Asp, Ala, Thr,  
Glu, Gln, Ser, Phe, Met, Val, Lys, Arg, Tyr or Pro;  
Xaa at position 99 is Ile, Leu, Arg, Asp, Val, Pro, Gln,  
Gly, Ser, Phe, or His;  
25 Xaa at position 100 is Lys, Tyr, Leu, His, Arg, Ile, Ser,  
Gln, or Pro;  
Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Val,  
Tyr, Glu, Asn, Ser, Ala, Gly, Ile, Leu, or Gln;  
Xaa at position 102 is Gly, Leu, Glu, Lys, Ser, Tyr, or  
30 Pro;  
Xaa at position 103 is Asp, or Ser;  
Xaa at position 104 is Trp, Val, Cys, Tyr, Thr, Met, Pro,  
Leu, Gln, Lys, Ala, Phe, or Gly;  
Xaa at position 105 is Asn, Pro, Ala, Phe, Ser, Trp, Gln,  
35 Tyr, Leu, Lys, Ile, Asp, or His;  
Xaa at position 106 is Glu, Ser, Ala, Lys, Thr, Ile, Gly,

or Pro;

Xaa at position 108 is Arg, Lys, Asp, Leu, Thr, Ile, Gln,  
His, Ser, Ala or Pro;

Xaa at position 109 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser,  
5 or Gly;

Xaa at position 110 is Lys, Ala, Asn, Thr, Leu, Arg, Gln,  
His, Glu, Ser, Ala, or Trp;

Xaa at position 111 is Leu, Ile, Arg, Asp, or Met;

Xaa at position 112 is Thr, Val, Gln, Tyr, Glu, His, Ser,  
10 or Phe;

Xaa at position 113 is Phe, Ser, Cys, His, Gly, Trp, Tyr,  
Asp, Lys, Leu, Ile, Val or Asn;

Xaa at position 114 is Tyr, Cys, His, Ser, Trp, Arg, or  
Leu;

15 Xaa at position 115 is Leu, Asn, Val, Pro, Arg, Ala, His,  
Thr, Trp, or Met;

Xaa at position 116 is Lys, Leu, Pro, Thr, Met, Asp, Val,  
Glu, Arg, Trp, Ser, Asn, His, Ala, Tyr, Phe, Gln, or  
Ile;

20 Xaa at position 117 is Thr, Ser, Asn, Ile, Trp, Lys, or  
Pro;

Xaa at position 118 is Leu, Ser, Pro, Ala, Glu, Cys, Asp,  
or Tyr;

Xaa at position 119 is Glu, Ser, Lys, Pro, Leu, Thr, Tyr,  
25 or Arg;

Xaa at position 120 is Asn, Ala, Pro, Leu, His, Val, or  
Gln;

Xaa at position 121 is Ala, Ser, Ile, Asn, Pro, Lys, Asp,  
or Gly;

30 Xaa at position 122 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
His, Ile, Tyr, or Cys;

Xaa at position 123 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
or Leu;

35 and which can additionally have Met- preceding the amino  
acid in position 1; and wherein from 1 to 14 amino acids

can be deleted from the N-terminus and/or from 1 to 15  
amino acids can be deleted from the C-terminus; and wherein  
from 4 to 44 of the amino acids designated by Xaa are  
different from the corresponding amino acids of native (1-  
5 133) human interleukin-3; and

a colony stimulating factor selected from the group  
consisting of GM-CSF, CSF-1, G-CSF, Meg-CSF (more recently  
referred to as c-mpl ligand), M-CSF, erythropoietin (EPO),  
IL-1, IL-4, IL-2, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-  
10 11, IL-12, IL-13, LIF, flt3/flk2, human growth hormone, B-  
cell growth factor, B-cell differentiation factor,  
eosinophil differentiation factor and stem cell factor  
(SCF).

15 15. A method of increasing multi-lineage  
hematopoietic cell production in a mammal in need thereof  
comprising administering a pharmaceutically effective  
amount of human interleukin-3 mutant polypeptide of the  
Formula:

20 Ala Pro Met Thr Gln Thr Thr Ser Leu Lys Thr Ser Trp Val Asn  
1 5 10 15  
Cys Xaa Xaa Xaa Ile Xaa Glu Xaa Xaa Xaa Xaa Leu Lys Xaa Xaa  
25 20 25 30  
Xaa Xaa Xaa Xaa Xaa Asp Xaa Xaa Asn Leu Asn Xaa Glu Xaa Xaa  
35 40 45  
30 Xaa Ile Leu Met Xaa Xaa Asn Leu Xaa Xaa Xaa Asn Leu Glu Xaa  
50 55 60  
Phe Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Xaa Xaa Ile Glu  
65 70 75  
35 Xaa Xaa Leu Xaa Xaa Leu Xaa Xaa Cys Xaa Pro Xaa Xaa Thr Ala

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	80	85	90
	Xaa Pro Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Asp Xaa Xaa		
	95	100	105
5	Xaa Phe Xaa Xaa Lys Leu Xaa Phe Xaa Xaa Xaa Xaa Xaa Leu Glu Xaa		
	110	115	120
	Xaa Xaa Xaa Gln Gln Thr Thr Leu Ser Leu Ala Ile Phe		
10	125	130	
	[SEQ ID NO:2]		

wherein

- Xaa at position 17 is Ser, Gly, Asp, Met, or Gln;
- 15 Xaa at position 18 is Asn, His, or Ile;
- Xaa at position 19 is Met or Ile;
- Xaa at position 21 is Asp or Glu;
- Xaa at position 23 is Ile, Ala, Leu, or Gly;
- Xaa at position 24 is Ile, Val, or Leu;
- 20 Xaa at position 25 is Thr, His, Gln, or Ala;
- Xaa at position 26 is His or Ala;
- Xaa at position 29 is Gln, Asn, or Val;
- Xaa at position 30 is Pro, Gly, or Gln;
- Xaa at position 31 is Pro, Asp, Gly, or Gln;
- 25 Xaa at position 32 is Leu, Arg, Gln, Asn, Gly, Ala, or  
Glu;
- Xaa at position 33 is Pro or Glu;
- Xaa at position 34 is Leu, Val, Gly, Ser, Lys, Ala, Arg,  
Gln, Glu, Ile, Phe, Thr or Met;
- 30 Xaa at position 35 is Leu, Ala, Asn, Pro, Gln, or Val;
- Xaa at position 37 is Phe, Ser, Pro, or Trp;
- Xaa at position 38 is Asn or Ala;
- Xaa at position 42 is Gly, Asp, Ser, Cys, Ala, Asn, Ile,  
Leu, Met, Tyr or Arg;
- 35 Xaa at position 44 is Asp or Glu;
- Xaa at position 45 is Gln, Val, Met, Leu, Thr, Ala, Asn,

Glu, Ser or Lys;  
Xaa at position 46 is Asp, Phe, Ser, Thr, Ala, Asn Gln,  
Glu, His, Ile, Lys, Tyr, Val or Cys;  
Xaa at position 50 is Glu, Ala, Asn, Ser or Asp;  
5 Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 54 is Arg or Ala;  
Xaa at position 55 is Arg, Thr, Val, Leu, or Gly;  
Xaa at position 56 is Pro, Gly, Ser, Gln, Ala, Arg, Asn,  
10 Glu, Leu, Thr, Val or Lys;  
Xaa at position 60 is Ala or Ser;  
Xaa at position 62 is Asn, Pro, Thr, or Ile;  
Xaa at position 63 is Arg or Lys;  
Xaa at position 64 is Ala or Asn;  
15 Xaa at position 65 is Val or Thr;  
Xaa at position 66 is Lys or Arg;  
Xaa at position 67 is Ser, Phe, or His;  
Xaa at position 68 is Leu, Ile, Phe, or His;  
Xaa at position 69 is Gln, Ala, Pro, Thr, Glu, Arg, or  
20 Gly;  
Xaa at position 71 is Ala, Pro, or Arg;  
Xaa at position 72 is Ser, Glu, Arg, or Asp;  
Xaa at position 73 is Ala or Leu;  
Xaa at position 76 is Ser, Val, Ala, Asn, Glu, Pro, or  
25 Gly;  
Xaa at position 77 is Ile or Leu;  
Xaa at position 79 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
Gly, or Asp;  
Xaa at position 80 is Asn, Gly, Glu, or Arg;  
30 Xaa at position 82 is Leu, Gln, Trp, Arg, Asp, Ala, Asn,  
Glu, His, Ile, Met, Phe, Ser, Thr, Tyr or Val;  
Xaa at position 83 is Pro or Thr;  
Xaa at position 85 is Leu or Val;  
Xaa at position 87 is Leu or Ser;  
35 Xaa at position 88 is Ala or Trp;  
Xaa at position 91 is Ala or Pro;

- Xaa at position 93 is Thr, Asp, Ser, Pro, Ala, Leu, or Arg;
- Xaa at position 95 is His, Pro, Arg, Val, Leu, Gly, Asn, Phe, Ser or Thr;
- 5 Xaa at position 96 is Pro or Tyr;
- Xaa at position 97 is Ile or Val;
- Xaa at position 98 is His, Ile, Asn, Leu, Ala, Thr, Leu, Arg, Gln, Leu, Lys, Met, Ser, Tyr, Val or Pro;
- Xaa at position 99 is Ile, Leu, or Val;
- 10 Xaa at position 100 is Lys, Arg, Ile, Gln, Pro, or Ser;
- Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Pro, Asn, Ile, Leu or Tyr;
- Xaa at position 104 is Trp or Leu;
- Xaa at position 105 is Asn, Pro, Ala, Ser, Trp, Gln, Tyr, Leu, Lys, Ile, Asp, or His;
- 15 Xaa at position 106 is Glu or Gly;
- Xaa at position 108 is Arg, Ala, or Ser;
- Xaa at position 109 is Arg, Thr, Glu, Leu, or Ser;
- Xaa at position 112 is Thr, Val, or Gln;
- 20 Xaa at position 114 is Tyr or Trp;
- Xaa at position 115 is Leu or Ala;
- Xaa at position 116 is Lys, Thr, Val, Trp, Ser, Ala, His, Met, Phe, Tyr or Ile;
- Xaa at position 117 is Thr or Ser;
- 25 Xaa at position 120 is Asn, Pro, Leu, His, Val, or Gln;
- Xaa at position 121 is Ala, Ser, Ile, Asn, Pro, Asp, or Gly;
- Xaa at position 122 is Gln, Ser, Met, Trp, Arg, Phe, Pro, His, Ile, Tyr, or Cys;
- 30 Xaa at position 123 is Ala, Met, Glu, His, Ser, Pro, Tyr, or Leu;

and which can additionally have Met- preceding the amino acid in position 1; and wherein from 1 to 14 amino acids

35 can be deleted from the N-terminus and/or from 1 to 15 amino acids can be deleted from the C-terminus; and wherein

from 4 to 35 of the amino acids designated by Xaa are  
different from the corresponding amino acids of native (1-  
133)human interleukin-3; and

5 A pharmaceutically effective amount of a colony stimulating  
factor.

16. The method of claim 15, wherein said human  
interleukin-3 mutant polypeptide is of the Formula:

10

Ala	Pro	Met	Thr	Gln	Thr	Thr	Ser	Leu	Lys	Thr	Ser	Trp	Val	Asn
1				5					10					15

15

Cys	Xaa	Xaa	Met	Ile	Asp	Glu	Xaa	Ile	Xaa	Xaa	Leu	Lys	Xaa	Xaa
				20					25					30

Pro	Xaa	Pro	Xaa	Xaa	Asp	Phe	Xaa	Asn	Leu	Asn	Xaa	Glu	Asp	Xaa
				35					40					45

20

Xaa	Ile	Leu	Met	Xaa	Xaa	Asn	Leu	Arg	Xaa	Xaa	Asn	Leu	Glu	Ala
				50					55					60

25

Phe	Xaa	Arg	Xaa	Xaa	Lys	Xaa	Xaa	Xaa	Asn	Ala	Ser	Ala	Ile	Glu
				65					70					75

Xaa	Xaa	Leu	Xaa	Xaa	Leu	Xaa	Pro	Cys	Leu	Pro	Xaa	Xaa	Thr	Ala
				80					85					90

30

Xaa	Pro	Xaa	Arg	Xaa	Pro	Ile	Xaa	Xaa	Xaa	Xaa	Gly	Asp	Trp	Xaa
				95					100					105

Glu	Phe	Xaa	Xaa	Lys	Leu	Xaa	Phe	Tyr	Leu	Xaa	Xaa	Leu	Glu	Xaa
				110					115					120

35

Xaa	Xaa	Xaa	Gln	Gln	Thr	Thr	Leu	Ser	Leu	Ala	Ile	Phe
			125						130			

[SEQ ID NO:3]



wherein

- Xaa at position 17 is Ser, Gly, Asp, or Gln;  
Xaa at position 18 is Asn, His, or Ile;  
5 Xaa at position 23 is Ile, Ala, Leu, or Gly;  
Xaa at position 25 is Thr, His, or Gln;  
Xaa at position 26 is His or Ala;  
Xaa at position 29 is Gln or Asn;  
Xaa at position 30 is Pro or Gly;  
10 Xaa at position 32 is Leu, Arg, Asn, or Ala;  
Xaa at position 34 is Leu, Val, Ser, Ala, Arg, Gln, Glu,  
Ile, Phe, Thr, or Met;  
Xaa at position 35 is Leu, Ala, Asn, or Pro;  
Xaa at position 38 is Asn or Ala;  
15 Xaa at position 42 is Gly, Asp, Ser, Ala, Asn, Ile, Leu,  
Met, Tyr or Arg;  
Xaa at position 45 is Gln, Val, Met, Leu, Ala, Asn, Glu,  
or Lys;  
Xaa at position 46 is Asp, Phe, Ser, Gln, Glu, His, Val  
20 or Thr;  
Xaa at position 50 is Glu Asn, Ser or Asp;  
Xaa at position 51 is Asn, Arg, Pro, Thr, or His;  
Xaa at position 55 is Arg, Leu, or Gly;  
Xaa at position 56 is Pro, Gly, Ser, Ala, Asn, Val, Leu or  
25 Gln;  
Xaa at position 62 is Asn, Pro, or Thr;  
Xaa at position 64 is Ala or Asn;  
Xaa at position 65 is Val or Thr;  
Xaa at position 67 is Ser or Phe;  
30 Xaa at position 68 is Leu or Phe;  
Xaa at position 69 is Gln, Ala, Glu, or Arg;  
Xaa at position 76 is Ser, Val, Asn, Pro, or Gly;  
Xaa at position 77 is Ile or Leu;  
Xaa at position 79 is Lys, Gly, Asn, Met, Arg, Ile, or  
35 Gly;  
Xaa at position 80 is Asn, Gly, Glu, or Arg;

- Xaa at position 82 is Leu, Gln, Trp, Arg, Asp, Asn, Glu,  
His, Met, Phe, Ser, Thr, Tyr or Val;
- Xaa at position 87 is Leu or Ser;
- Xaa at position 88 is Ala or Trp;
- 5 Xaa at position 91 is Ala or Pro;
- Xaa at position 93 is Thr, Asp, or Ala;
- Xaa at position 95 is His, Pro, Arg, Val, Gly, Asn, Ser or  
Thr;
- 10 Xaa at position 98 is His, Ile, Asn, Ala, Thr, Gln, Glu,  
Lys, Met, Ser, Tyr, Val or Leu;
- Xaa at position 99 is Ile or Leu;
- Xaa at position 100 is Lys or Arg;
- Xaa at position 101 is Asp, Pro, Met, Lys, Thr, His, Pro,  
Asn, Ile, Leu or Tyr;
- 15 Xaa at position 105 is Asn, Pro, Ser, Ile or Asp;
- Xaa at position 108 is Arg, Ala, or Ser;
- Xaa at position 109 is Arg, Thr, Glu, Leu, or Ser;
- Xaa at position 112 is Thr or Gln;
- Xaa at position 116 is Lys, Val, Trp, Ala, His, Phe, Tyr  
20 or Ile;
- Xaa at position 117 is Thr or Ser;
- Xaa at position 120 is Asn, Pro, Leu, His, Val, or Gln;
- Xaa at position 121 is Ala, Ser, Ile, Pro, or Asp;
- Xaa at position 122 is Gln, Met, Trp, Phe, Pro, His, Ile,  
25 or Tyr;
- Xaa at position 123 is Ala, Met, Glu, Ser, or Leu;

- and which can additionally have Met- preceding the amino  
acid in position 1; and wherein from 1 to 14 amino acids  
30 can be deleted from the N-terminus and/or from 1 to 15  
amino acids can be deleted from the C-terminus; and wherein  
from 4 to 44 of the amino acids designated by Xaa are  
different from the corresponding amino acids of native (1-  
133)human interleukin-3: and
- 35 a colony stimulating factor selected from the group  
consisting of GM-CSF, CSF-1, G-CSF, Meg-CSF (more recently

referred to as c-mpl ligand), M-CSF, erythropoietin (EPO),  
 IL-1, IL-4, IL-2, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-  
 11, IL-12, IL-13, LIF, flt3/flk2, human growth hormone, B-  
 cell growth factor, B-cell differentiation factor,  
 5 eosinophil differentiation factor and stem cell factor  
 (SCF).

17. The method of claim 16, wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

10 Xaa at position 42 is Gly, Asp, Ser, Ile, Leu, Met, Tyr,  
 or Ala;  
 Xaa at position 45 is Gln, Val, Met or Asn;  
 Xaa at position 46 is Asp, Ser, Gln, His or Val;  
 15 Xaa at position 50 is Glu or Asp;  
 Xaa at position 51 is Asn, Pro or Thr;  
 Xaa at position 62 is Asn or Pro;  
 Xaa at position 76 is Ser, or Pro;  
 Xaa at position 82 is Leu, Trp, Asp, Asn Glu, His, Phe,  
 20 Ser or Tyr;  
 Xaa at position 95 is His, Arg, Thr, Asn or Ser;  
 Xaa at position 98 is His, Ile, Leu, Ala, Gln, Lys, Met,  
 Ser, Tyr or Val;  
 Xaa at position 100 is Lys or Arg;  
 25 Xaa at position 101 is Asp, Pro, His, Asn, Ile or Leu;  
 Xaa at position 105 is Asn, or Pro;  
 Xaa at position 108 is Arg, Ala, or Ser;  
 Xaa at position 116 is Lys, Val, Trp, Ala, His, Phe, or  
 Tyr;  
 30 Xaa at position 121 is Ala, or Ile;  
 Xaa at position 122 is Gln, or Ile; and  
 Xaa at position 123 is Ala, Met or Glu.

18. A method of increasing multi-lineage hematopoietic cell  
 35 production in a mammal in need thereof comprising administering a  
 pharmaceutically effective amount of a human interleukin-3 mutant

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polypeptide of the Formula:

	Asn	Cys	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
	1				5					10					15	
5																
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asn	Xaa	Xaa	Xaa	Xaa	Xaa	
					20					25					30	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
10					35					40					45	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					50					55					60	
15	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					65					70					75	
	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					80					85					90	
20																
	Xaa	Xaa	Phe	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	
					95					100					105	
	Xaa	Xaa	Xaa	Xaa	Gln	Gln	[SEQ ID NO:4]									
25					110											

wherein

	Xaa at position 3 is Ser, Lys, Gly, Asp, Met, Gln, or Arg;
	Xaa at position 4 is Asn, His, Leu, Ile, Phe, Arg, or Gln;
30	Xaa at position 5 is Met, Phe, Ile, Arg, Gly, Ala, or Cys;
	Xaa at position 6 is Ile, Cys, Gln, Glu, Arg, Pro, or Ala;
	Xaa at position 7 is Asp, Phe, Lys, Arg, Ala, Gly, Glu,
	Gln, Asn, Thr, Ser or Val;
	Xaa at position 8 is Glu, Trp, Pro, Ser, Ala, His, Asp,
35	Asn, Gln, Leu, Val, or Gly;
	Xaa at position 9 is Ile, Val, Ala, Leu, Gly, Trp, Lys,

Phe, Leu, Ser, or Arg;  
 Xaa at position 10 is Ile, Gly, Val, Arg, Ser, Phe, or  
 Leu;  
 Xaa at position 11 is Thr, His, Gly, Gln, Arg, Pro, or  
 5       Ala;  
 Xaa at position 12 is His, Thr, Phe, Gly, Arg, Ala, or  
 Trp;  
 Xaa at position 13 is Leu, Gly, Arg, Thr, Ser, or Ala;  
 Xaa at position 14 is Lys, Arg, Leu, Gln, Gly, Pro, Val or  
 10       Trp;  
 Xaa at position 15 is Gln, Asn, Leu, Pro, Arg, or Val;  
 Xaa at position 16 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
 Leu, or Lys;  
 Xaa at position 17 is Pro, Asp, Gly, Ala, Arg, Leu, or  
 15       Gln;  
 Xaa at position 18 is Leu, Val, Arg, Gln, Asn, Gly, Ala,  
 or Glu;  
 Xaa at position 19 is Pro, Leu, Gln, Ala, Thr, or Glu;  
 Xaa at position 20 is Leu, Val, Gly, Ser, Lys, Glu, Gln,  
 20       Thr, Arg, Ala, Phe, Ile or Met;  
 Xaa at position 21 is Leu, Ala, Gly, Asn, Pro, Gln, or  
 Val;  
 Xaa at position 22 is Asp, Leu, or Val;  
 Xaa at position 23 is Phe, Ser, Pro, Trp, or Ile;  
 25       Xaa at position 24 is Asn, or Ala;  
 Xaa at position 26 is Leu, Trp, or Arg;  
 Xaa at position 27 is Asn, Cys, Arg, Leu, His, Met, Pro;  
 Xaa at position 28 is Gly, Asp, Ser, Cys, Ala, Lys, Asn,  
 Thr, Leu, Val, Glu, Phe, Tyr, Ile or Met;  
 30       Xaa at position 29 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
 Cys, Gln, Arg, Thr, Gly or Ser;  
 Xaa at position 30 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
 Trp, Glu, Asn, Gln, Ala or Pro;  
 Xaa at position 31 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
 35       Lys, Asp, Asn, Arg, Ser, Ala, Ile, Glu, His or Trp;  
 Xaa at position 32 is Asp, Phe, Ser, Thr, Cys, Glu, Asn,

Gln, Lys, His, Ala, Tyr, Ile, Val or Gly;  
Xaa at position 33 is Ile, Gly, Val, Ser, Arg, Pro, or  
His;  
Xaa at position 34 is Leu, Ser, Cys, Arg, Ile, His, Phe,  
5 Glu, Lys, Thr, Ala, Met, Val or Asn;  
Xaa at position 35 is Met, Arg, Ala, Gly, Pro, Asn, His,  
or Asp;  
Xaa at position 36 is Glu, Leu, Thr, Asp, Tyr, Lys, Asn,  
Ser, Ala, Ile, Val, His, Phe, Met or Gln;  
10 Xaa at position 37 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 38 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;  
Xaa at position 39 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
15 Ser, Met, or;  
Xaa at position 40 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
Asn, Lys, His, Ala or Leu;  
Xaa at position 41 is Arg, Thr, Val, Ser, Leu, or Gly;  
Xaa at position 42 is Pro, Gly, Cys, Ser, Gln, Glu, Arg,  
20 His, Thr, Ala, Tyr, Phe, Leu, Val or Lys;  
Xaa at position 43 is Asn or Gly;  
Xaa at position 44 is Leu, Ser, Asp, Arg, Gln, Val, or  
Cys;  
Xaa at position 45 is Glu Tyr, His, Leu, Pro, or Arg;  
25 Xaa at position 46 is Ala, Ser, Pro, Tyr, Asn, or Thr;  
Xaa at position 47 is Phe, Asn, Glu, Pro, Lys, Arg, or  
Ser;  
Xaa at position 48 is Asn, His, Val, Arg, Pro, Thr, Asp,  
or Ile;  
30 Xaa at position 49 is Arg, Tyr, Trp, Lys, Ser, His, Pro,  
or Val;  
Xaa at position 50 is Ala, Asn, Pro, Ser, or Lys;  
Xaa at position 51 is Val, Thr, Pro, His, Leu, Phe, or  
Ser;  
35 Xaa at position 52 is Lys, Ile, Arg, Val, Asn, Glu, or  
Ser;

- Xaa at position 53 is Ser, Ala, Phe, Val, Gly, Asn, Ile,  
Pro, or His;
- Xaa at position 54 is Leu, Val, Trp, Ser, Ile, Phe, Thr,  
or His;
- 5 Xaa at position 55 is Gln, Ala, Pro, Thr, Glu, Arg, Trp,  
Gly, or Leu;
- Xaa at position 56 is Asn, Leu, Val, Trp, Pro, or Ala;
- Xaa at position 57 is Ala, Met, Leu, Pro, Arg, Glu, Thr,  
Gln, Trp, or Asn;
- 10 Xaa at position 58 is Ser, Glu, Met, Ala, His, Asn, Arg,  
or Asp;
- Xaa at position 59 is Ala, Glu, Asp, Leu, Ser, Gly, Thr,  
or Arg;
- Xaa at position 60 is Ile, Met, Thr, Pro, Arg, Gly, Ala;
- 15 Xaa at position 61 is Glu, Lys, Gly, Asp, Pro, Trp, Arg,  
Ser, Gln, or Leu;
- Xaa at position 62 is Ser, Val, Ala, Asn, Trp, Glu, Pro,  
Gly, or Asp;
- Xaa at position 63 is Ile, Ser, Arg, Thr, or Leu;
- 20 Xaa at position 64 is Leu, Ala, Ser, Glu, Phe, Gly, or  
Arg;
- Xaa at position 65 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
or Asp;
- Xaa at position 66 is Asn, Trp, Val, Gly, Thr, Leu, Glu,  
or Arg;
- 25 Xaa at position 67 is Leu, Gln, Gly, Ala, Trp, Arg, Val,  
or Lys;
- Xaa at position 68 is Leu, Gln, Lys, Trp, Arg, Asp, Glu,  
Asn, His, Thr, Ser, Ala, Tyr, Phe, Ile, Met or Val;
- 30 Xaa at position 69 is Pro, Ala, Thr, Trp, Arg, or Met;
- Xaa at position 70 is Cys, Glu, Gly, Arg, Met, or Val;
- Xaa at position 71 is Leu, Asn, Val, or Gln;
- Xaa at position 72 is Pro, Cys, Arg, Ala, or Lys;
- Xaa at position 73 is Leu, Ser, Trp, or Gly;
- 35 Xaa at position 74 is Ala, Lys, Arg, Val, or Trp;
- Xaa at position 75 is Thr, Asp, Cys, Leu, Val, Glu, His,

Asn, or Ser;  
Xaa at position 76 is Ala, Pro, Ser, Thr, Gly, Asp, Ile,  
or Met;  
Xaa at position 77 is Ala, Pro, Ser, Thr, Phe, Leu, Asp,  
5 or His;  
Xaa at position 78 is Pro, Phe, Arg, Ser, Lys, His, Ala,  
Gly, Ile or Leu;  
Xaa at position 79 is Thr, Asp, Ser, Asn, Pro, Ala, Leu,  
or Arg;  
10 Xaa at position 80 is Arg, Ile, Ser, Glu, Leu, Val, Gln,  
Lys, His, Ala or Pro;  
Xaa at position 81 is His, Gln, Pro, Arg, Val, Leu, Gly,  
Thr, Asn, Lys, Ser, Ala, Trp, Phe, Ile or Tyr;  
Xaa at position 82 is Pro, Lys, Tyr, Gly, Ile, or Thr;  
15 Xaa at position 83 is Ile, Val, Lys, Ala, or Asn;  
Xaa at position 84 is His, Ile, Asn, Leu, Asp, Ala, Thr,  
Glu, Gln, Ser, Phe, Met, Val, Lys, Arg, Tyr or Pro;  
Xaa at position 85 is Ile, Leu, Arg, Asp, Val, Pro, Gln,  
Gly, Ser, Phe, or His;  
20 Xaa at position 86 is Lys, Tyr, Leu, His, Arg, Ile, Ser,  
Gln, Pro;  
Xaa at position 87 is Asp, Pro, Met, Lys, His, Thr, Val,  
Tyr, Glu, Asn, Ser, Ala, Gly, Ile, Leu or Gln;  
Xaa at position 88 is Gly, Leu, Glu, Lys, Ser, Tyr, or  
25 Pro;  
Xaa at position 89 is Asp, or Ser;  
Xaa at position 90 is Trp, Val, Cys, Tyr, Thr, Met, Pro,  
Leu, Gln, Lys, Ala, Phe, or Gly;  
Xaa at position 91 is Asn, Pro, Ala, Phe, Ser, Trp, Gln,  
30 Tyr, Leu, Lys, Ile, Asp, or His;  
Xaa at position 92 is Glu, Ser, Ala, Lys, Thr, Ile, Gly,  
or Pro;  
Xaa at position 94 is Arg, Lys, Asp, Leu, Thr, Ile, Gln,  
His, Ser, Ala, or Pro;  
35 Xaa at position 95 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser,  
or Gly;



- Xaa at position 96 is Lys, Asn, Thr, Leu, Gln, Arg,  
His, Glu, Ser, Ala or Trp;
- Xaa at position 97 is Leu, Ile, Arg, Asp, or Met;
- Xaa at position 98 is Thr, Val, Gln, Tyr, Glu, His, Ser,  
5 or Phe;
- Xaa at position 99 is Phe, Ser, Cys, His, Gly, Trp, Tyr,  
Asp, Lys, Leu, Ile, Val or Asn;
- Xaa at position 100 is Tyr, Cys, His, Ser, Trp, Arg, or  
Leu;
- 10 Xaa at position 101 is Leu, Asn, Val, Pro, Arg, Ala, His,  
Thr, Trp, or Met;
- Xaa at position 102 is Lys, Leu, Pro, Thr, Met, Asp, Val,  
Glu, Arg, Trp, Ser, Asn, His, Ala, Tyr, Phe, Gln, or  
Ile;
- 15 Xaa at position 103 is Thr, Ser, Asn, Ile, Trp, Lys, or  
Pro;
- Xaa at position 104 is Leu, Ser, Pro, Ala, Glu, Cys, Asp,  
or Tyr;
- Xaa at position 105 is Glu, Ser, Lys, Pro, Leu, Thr, Tyr,  
20 or Arg;
- Xaa at position 106 is Asn, Ala, Pro, Leu, His, Val, or  
Gln;
- Xaa at position 107 is Ala, Ser, Ile, Asn, Pro, Lys, Asp,  
or Gly;
- 25 Xaa at position 108 is Gln, Ser, Met, Trp, Arg, Phe, Pro,  
His, Ile, Tyr, or Cys;
- Xaa at position 109 is Ala, Met, Glu, His, Ser, Pro, Tyr,  
or Leu;
- 30 and which can additionally have Met- or Met-Ala- preceding  
the amino acid in position 1; and wherein from 4 to 44 of  
the amino acids designated by Xaa are different from the  
corresponding native amino acids of (1-133) human  
interleukin-3; and
- 35 A pharmaceutically effective amount of a colony  
stimulating factor.

19. The method of claim 18, wherein said human interleukin-3 mutant polypeptide is of the Formula:

5	Asn Cys Xaa Xaa Xaa Ile Xaa Glu Xaa Xaa Xaa Xaa Leu Lys Xaa
1	5 10 15
	Xaa Xaa Xaa Xaa Xaa Xaa Asp Xaa Xaa Asn Leu Asn Xaa Glu Xaa
	20 25 30
10	Xaa Xaa Ile Leu Met Xaa Xaa Asn Leu Xaa Xaa Xaa Asn Leu Glu
	35 40 45
	Xaa Phe Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Xaa Xaa Ile
15	50 55 60
	Glu Xaa Xaa Leu Xaa Xaa Leu Xaa Xaa Cys Xaa Pro Xaa Xaa Thr
	65 70 75
20	Ala Xaa Pro Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Asp Xaa
	80 85 90
	Xaa Xaa Phe Xaa Xaa Lys Leu Xaa Phe Xaa Xaa Xaa Xaa Leu Glu
	95 100 105
25	Xaa Xaa Xaa Xaa Gln Gln [SEQ ID NO:5]
	110

wherein

30	Xaa at position 3 is Ser, Gly, Asp, Met, or Gln;
	Xaa at position 4 is Asn, His, or Ile;
	Xaa at position 5 is Met or Ile;
	Xaa at position 7 is Asp or Glu;
	Xaa at position 9 is Ile, Ala, Leu, or Gly;
35	Xaa at position 10 is Ile, Val, or Leu;
	Xaa at position 11 is Thr, His, Gln, or Ala;

- Xaa at position 12 is His or Ala;  
Xaa at position 15 is Gln, Asn, or Val;  
Xaa at position 16 is Pro, Gly, or Gln;  
Xaa at position 17 is Pro, Asp, Gly, or Gln;  
5 Xaa at position 18 is Leu, Arg, Gln, Asn, Gly, Ala, or  
Glu;  
Xaa at position 19 is Pro or Glu;  
Xaa at position 20 is Leu, Val, Gly, Ser, Lys, Ala, Arg,  
Gln, Glu, Ile, Phe, Thr or Met;  
10 Xaa at position 21 is Leu, Ala, Asn, Pro, Gln, or Val;  
Xaa at position 23 is Phe, Ser, Pro, or Trp;  
Xaa at position 24 is Asn or Ala;  
Xaa at position 28 is Gly, Asp, Ser, Cys, Ala, Asn, Ile,  
Leu, Met Tyr or Arg;  
15 Xaa at position 30 is Asp or Glu;  
Xaa at position 31 is Gln, Val, Met, Leu, Thr, Ala, Asn,  
Glu, Ser or Lys;  
Xaa at position 32 is Asp, Phe, Ser, Thr, Ala, Asn, Gln,  
Glu, His, Ile, Lys, Tyr, Val or Cys;  
20 Xaa at position 36 is Glu, Ala, Asn, Ser or Asp;  
Xaa at position 37 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 40 is Arg or Ala;  
Xaa at position 41 is Arg, Thr, Val, Leu, or Gly;  
25 Xaa at position 42 is Pro, Gly, Ser, Gln, Ala, Arg, Asn,  
Glu, Leu, Thr, Val or Lys;  
Xaa at position 46 is Ala or Ser;  
Xaa at position 48 is Asn, Pro, Thr, or Ile;  
Xaa at position 49 is Arg or Lys;  
30 Xaa at position 50 is Ala or Asn;  
Xaa at position 51 is Val or Thr;  
Xaa at position 52 is Lys or Arg;  
Xaa at position 53 is Ser, Phe, or His;  
Xaa at position 54 is Leu, Ile, Phe, or His;  
35 Xaa at position 55 is Gln, Ala, Pro, Thr, Glu, Arg, or  
Gly;

- Xaa at position 57 is Ala, Pro, or Arg;  
Xaa at position 58 is Ser, Glu, Arg, or Asp;  
Xaa at position 59 is Ala or Leu;  
Xaa at position 62 is Ser, Val, Ala, Asn, Glu, Pro, or  
5 Gly;  
Xaa at position 63 is Ile or Leu;  
Xaa at position 65 is Lys, Thr, Gly, Asn, Met, Arg, Ile,  
Gly, or Asp;  
Xaa at position 66 is Asn, Gly, Glu, or Arg;  
10 Xaa at position 68 is Leu, Gln, Trp, Arg, Asp, Ala, Asn,  
Glu, His, Ile, Met, Phe, Ser, Thr, Tyr or Val;  
Xaa at position 69 is Pro or Thr;  
Xaa at position 71 is Leu or Val;  
Xaa at position 73 is Leu or Ser;  
15 Xaa at position 74 is Ala or Trp;  
Xaa at position 77 is Ala or Pro;  
Xaa at position 79 is Thr, Asp, Ser, Pro, Ala, Leu, or  
Arg;  
Xaa at position 81 is His, Pro, Arg, Val, Leu, Gly, Asn,  
20 Phe, Ser or Thr;  
Xaa at position 82 is Pro or Tyr;  
Xaa at position 83 is Ile or Val;  
Xaa at position 84 is His, Ile, Asn, Leu, Ala, Thr, Leu,  
Arg, Gln, Leu, Lys, Met, Ser, Tyr, Val or Pro;  
25 Xaa at position 85 is Ile, Leu, or Val;  
Xaa at position 86 is Lys, Arg, Ile, Gln, Pro, or Ser;  
Xaa at position 87 is Asp, Pro, Met, Lys, His, Thr, Asn,  
Ile, Leu or Tyr;  
Xaa at position 90 is Trp or Leu;  
30 Xaa at position 91 is Asn, Pro, Ala, Ser, Trp, Gln, Tyr,  
Leu, Lys, Ile, Asp, or His;  
Xaa at position 92 is Glu, or Gly;  
Xaa at position 94 is Arg, Ala, or Ser;  
Xaa at position 95 is Arg, Thr, Glu, Leu, or Ser;  
35 Xaa at position 98 is Thr, Val, or Gln;  
Xaa at position 100 is Tyr or Trp;

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	80	85	90
	Xaa Glu Phe Xaa Xaa Lys Leu Xaa Phe Tyr Leu Xaa Xaa Leu Glu		
	95	100	105

5 Xaa Xaa Xaa Xaa Gln Gln [SEQ ID NO:6]  
110

wherein

Xaa at position 3 is Ser, Gly, Asp, or Gln;

10 Xaa at position 4 is Asn, His, or Ile;  
Xaa at position 9 is Ile, Ala, Leu, or Gly;  
Xaa at position 11 is Thr, His, or Gln;  
Xaa at position 12 is His or Ala;  
Xaa at position 15 is Gln or Asn;

15 Xaa at position 16 is Pro or Gly;  
Xaa at position 18 is Leu, Arg, Asn, or Ala;  
Xaa at position 20 is Leu, Val, Ser, Ala, Arg, Gln, Glu,  
Ile, Phe, Thr or Met;  
Xaa at position 21 is Leu, Ala, Asn, or Pro;

20 Xaa at position 24 is Asn or Ala;  
Xaa at position 28 is Gly, Asp, Ser, Ala, Asn, Ile, Leu,  
Met, Tyr or Arg;  
Xaa at position 31 is Gln, Val, Met, Leu, Ala, Asn, Glu or  
Lys;

25 Xaa at position 32 is Asp, Phe, Ser, Ala, Gln, Glu, His,  
Val or Thr;  
Xaa at position 36 is Glu, Asn, Ser or Asp;  
Xaa at position 37 is Asn, Arg, Pro, Thr, or His;  
Xaa at position 41 is Arg, Leu, or Gly;

30 Xaa at position 42 is Pro, Gly, Ser, Ala, Asn, Val, Leu or  
Gln;  
Xaa at position 48 is Asn, Pro, or Thr;  
Xaa at position 50 is Ala or Asn;  
Xaa at position 51 is Val or Thr;

35 Xaa at position 53 is Ser or Phe;  
Xaa at position 54 is Leu or Phe;

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- Xaa at position 55 is Gln, Ala, Glu, or Arg;  
 Xaa at position 62 is Ser, Val, Asn, Pro, or Gly;  
 Xaa at position 63 is Ile or Leu;  
 Xaa at position 65 is Lys, Asn, Met, Arg, Ile, or Gly;  
 5 Xaa at position 66 is Asn, Gly, Glu, or Arg;  
 Xaa at position 68 is Leu, Gln, Trp, Arg, Asp, Asn, Glu,  
     His, Met, Phe, Ser, Thr, Tyr or Val;  
 Xaa at position 73 is Leu or Ser;  
 Xaa at position 74 is Ala or Trp;  
 10 Xaa at position 77 is Ala or Pro;  
 Xaa at position 79 is Thr, Asp, or Ala;  
 Xaa at position 81 is His, Pro, Arg, Val, Gly, Asn, Ser or  
     Thr;  
 Xaa at position 84 is His, Ile, Asn, Ala, Thr, Arg, Gln,  
 15      Glu, Lys, Met, Ser, Tyr, Val or Leu;  
 Xaa at position 85 is Ile or Leu;  
 Xaa at position 86 is Lys or Arg;  
 Xaa at position 87 is Asp, Pro, Met, Lys, His, Pro, Asn,  
     Ile, Leu or Tyr;  
 20 Xaa at position 91 is Asn, Pro, Ser, Ile or Asp;  
 Xaa at position 94 is Arg, Ala, or Ser;  
 Xaa at position 95 is Arg, Thr, Glu, Leu, or Ser;  
 Xaa at position 98 is Thr or Gln;  
 Xaa at position 102 is Lys, Val, Trp, or Ile;  
 25 Xaa at position 103 is Thr, Ala, His, Phe, Tyr or Ser;  
 Xaa at position 106 is Asn, Pro, Leu, His, Val, or Gln;  
 Xaa at position 107 is Ala, Ser, Ile, Pro, or Asp;  
 Xaa at position 108 is Gln, Met, Trp, Phe, Pro, His, Ile,  
     or Tyr;  
 30 Xaa at position 109 is Ala, Met, Glu, Ser, or Leu;

and which can additionally have Met- or Met-Ala- preceding  
 the amino acid in position 1; and wherein from 4 to 26 of  
 the amino acids designated by Xaa are different from the  
 35 corresponding amino acids of native (1-133)human  
 interleukin-3.

21. The method of claim 20, wherein said human interleukin-3 mutant polypeptide is of the Formula:

- 5 Xaa at position 17 is Ser, Lys, Asp, Met, Gln, or Arg;  
Xaa at position 18 is Asn, His, Leu, Ile, Phe, Arg, or  
Gln;  
Xaa at position 19 is Met, Arg, Gly, Ala, or Cys;  
Xaa at position 20 is Ile, Cys, Gln, Glu, Arg, Pro, or  
10 Ala;  
Xaa at position 21 is Asp, Phe, Lys, Arg, Ala, Gly, or  
Val;  
Xaa at position 22 is Glu, Trp, Pro, Ser, Ala, His, or  
Gly;  
15 Xaa at position 23 is Ile, Ala, Gly, Trp, Lys, Leu, Ser,  
or Arg;  
Xaa at position 24 is Ile, Gly, Arg, or Ser;  
Xaa at position 25 is Thr, His, Gly, Gln, Arg, Pro, or  
Ala;  
20 Xaa at position 26 is His, Thr, Phe, Gly, Ala, or Trp;  
Xaa at position 27 is Leu, Gly, Arg, Thr, Ser, or Ala;  
Xaa at position 28 is Lys, Leu, Gln, Gly, Pro, Val or Trp;  
Xaa at position 29 is Gln, Asn, Pro, Arg, or Val;  
Xaa at position 30 is Pro, His, Thr, Gly, Asp, Gln, Ser,  
25 Leu, or Lys;  
Xaa at position 31 is Pro, Asp, Gly, Arg, Leu, or Gln;  
Xaa at position 32 is Leu, Arg, Gln, Asn, Gly, Ala, or  
Glu;  
Xaa at position 33 is Pro, Leu, Gln, Thr, or Glu;  
30 Xaa at position 34 is Leu, Gly, Ser, or Lys;  
Xaa at position 35 is Leu, Ala, Gly, Asn, Pro, or Gln;  
Xaa at position 36 is Asp, Leu, or Val;  
Xaa at position 37 is Phe, Ser, or Pro;  
Xaa at position 38 is Asn, or Ala;  
35 Xaa at position 40 is Leu, Trp, or Arg;  
Xaa at position 41 is Asn, Cys, Arg, Leu, His, Met, Pro;



Xaa at position 42 is Gly, Asp, Ser, Cys, or Ala;  
Xaa at position 42 is Glu, Asn, Tyr, Leu, Phe, Asp, Ala,  
Cys, or Ser;  
Xaa at position 44 is Asp, Ser, Leu, Arg, Lys, Thr, Met,  
5 Trp, or Pro;  
Xaa at position 45 is Gln, Pro, Phe, Val, Met, Leu, Thr,  
Lys, or Trp;  
Xaa at position 46 is Asp, Phe, Ser, Thr, Cys, or Gly;  
Xaa at position 47 is Ile, Gly, Ser, Arg, Pro, or His;  
10 Xaa at position 48 is Leu, Ser, Cys, Arg, His, Phe, or  
Asn;  
Xaa at position 49 is Met, Arg, Ala, Gly, Pro, Asn, His,  
or Asp;  
Xaa at position 50 is Glu, Leu, Thr, Asp, or Tyr;  
15 Xaa at position 51 is Asn, Arg, Met, Pro, Ser, Thr, or  
His;  
Xaa at position 52 is Asn, His, Arg, Leu, Gly, Ser, or  
Thr;  
Xaa at position 53 is Leu, Thr, Ala, Gly, Glu, Pro, Lys,  
20 Ser, or;  
Xaa at position 54 is Arg, Asp, Ile, Ser, Val, Thr, Gln,  
or Leu;  
Xaa at position 55 is Arg, Thr, Val, Ser, Leu, or Gly;  
Xaa at position 56 is Pro, Gly, Cys, Ser, Gln, or Lys;  
25 Xaa at position 57 is Asn or Gly;  
Xaa at position 58 is Leu, Ser, Asp, Arg, Gln, Val, or  
Cys;  
Xaa at position 59 is Glu Tyr, His, Leu, Pro, or Arg;  
Xaa at position 60 is Ala, Ser, Tyr, Asn, or Thr;  
30 Xaa at position 61 is Phe, Asn, Glu, Pro, Lys, Arg, or  
Ser;  
Xaa at position 62 is Asn His, Val, Arg, Pro, Thr, or Ile;  
Xaa at position 63 is Arg, Tyr, Trp, Ser, Pro, or Val;  
Xaa at position 64 is Ala, Asn, Ser, or Lys;  
35 Xaa at position 65 is Val, Thr, Pro, His, Leu, Phe, or  
Ser;

- Xaa at position 66 is Lys, Ile, Val, Asn, Glu, or Ser;  
Xaa at position 67 is Ser, Ala, Phe, Val, Gly, Asn, Ile,  
Pro, or His;  
Xaa at position 68 is Leu, Val, Trp, Ser, Thr, or His;  
5 Xaa at position 69 is Gln, Ala, Pro, Thr, Arg, Trp, Gly,  
or Leu;  
Xaa at position 70 is Asn, Leu, Val, Trp, Pro, or Ala;  
Xaa at position 71 is Ala, Met, Leu, Arg, Glu, Thr, Gln,  
Trp, or Asn;  
10 Xaa at position 72 is Ser, Glu, Met, Ala, His, Asn, Arg,  
or Asp;  
Xaa at position 73 is Ala, Glu, Asp, Leu, Ser, Gly, Thr,  
or Arg;  
Xaa at position 74 is Ile, Thr, Pro, Arg, Gly, Ala;  
15 Xaa at position 75 is Glu, Lys, Gly, Asp, Pro, Trp, Arg,  
Ser, or Leu;  
Xaa at position 76 is Ser, Val, Ala, Asn, Trp, Glu, Pro,  
Gly, or Asp;  
Xaa at position 77 is Ile, Ser, Arg, or Thr;  
20 Xaa at position 78 is Leu, Ala, Ser, Glu, Gly, or Arg;  
Xaa at position 79 is Lys, Thr, Gly, Asn, Met, Ile, or  
Asp;  
Xaa at position 80 is Asn, Trp, Val, Gly, Thr, Leu, or  
Arg;  
25 Xaa at position 81 is Leu, Gln, Gly, Ala, Trp, Arg, or  
Lys;  
Xaa at position 82 is Leu, Gln, Lys, Trp, Arg, or Asp;  
Xaa at position 83 is Pro, Thr, Trp, Arg, or Met;  
Xaa at position 84 is Cys, Glu, Gly, Arg, Met, or Val;  
30 Xaa at position 85 is Leu, Asn, or Gln;  
Xaa at position 86 is Pro, Cys, Arg, Ala, or Lys;  
Xaa at position 87 is Leu, Ser, Trp, or Gly;  
Xaa at position 88 is Ala, Lys, Arg, Val, or Trp;  
Xaa at position 89 is Thr, Asp, Cys, Leu, Val, Glu, His,  
35 or Asn;  
Xaa at position 90 is Ala, Ser, Asp, Ile, or Met;

- Xaa at position 91 is Ala, Ser, Thr, Phe, Leu, Asp, or His;
- Xaa at position 92 is Pro, Phe, Arg, Ser, Lys, His, or Leu;
- 5 Xaa at position 93 is Thr, Asp, Ser, Asn, Pro, Ala, Leu, or Arg;
- Xaa at position 94 is Arg, Ile, Ser, Glu, Leu, Val, or Pro;
- Xaa at position 95 is His, Gln, Pro, Val, Leu, Thr or Tyr;
- 10 Xaa at position 96 is Pro, Lys, Tyr, Gly, Ile, or Thr;
- Xaa at position 97 is Ile, Lys, Ala, or Asn;
- Xaa at position 98 is His, Ile, Asn, Leu, Asp, Ala, Thr, or Pro;
- Xaa at position 99 is Ile, Arg, Asp, Pro, Gln, Gly, Phe, or His;
- 15 Xaa at position 100 is Lys, Tyr, Leu, His, Ile, Ser, Gln, or Pro;
- Xaa at position 101 is Asp, Pro, Met, Lys, His, Thr, Val, Tyr, or Gln;
- 20 Xaa at position 102 is Gly, Leu, Glu, Lys, Ser, Tyr, or Pro;
- Xaa at position 103 is Asp, or Ser;
- Xaa at position 104 is Trp, Val, Cys, Tyr, Thr, Met, Pro, Leu, Gln, Lys, Ala, Phe, or Gly;
- 25 Xaa at position 105 is Asn, Pro, Ala, Phe, Ser, Trp, Gln, Tyr, Leu, Lys, Ile, or His;
- Xaa at position 106 is Glu, Ser, Ala, Lys, Thr, Ile, Gly, or Pro;
- Xaa at position 108 is Arg, Asp, Leu, Thr, Ile, or Pro;
- 30 Xaa at position 109 is Arg, Thr, Pro, Glu, Tyr, Leu, Ser, or Gly.

22. The method of claim 19 wherein said human interleukin-3 mutant polypeptide is of the Formula:

	1		5		10
5	(Met) <sub>m</sub> -Ala	Pro	Met	Thr	Gln Thr Thr Ser Leu Lys Thr
	15		20		
	Ser Trp Val	Asn Cys	Ser Xaa Xaa Xaa	Asp Glu Ile Ile	
	25		30		35
	Xaa His Leu	Lys Xaa Pro Pro	Xaa Pro Xaa Leu	Asp Xaa	
10	40		45		50
	Xaa Asn Leu	Asn Xaa Glu Asp	Xaa Asp Ile Leu	Xaa Glu	
		55		60	
	Xaa Asn Leu	Arg Xaa Xaa Asn Leu	Xaa Xaa Phe Xaa Xaa		
	65		70		75
15	Ala Xaa Lys	Xaa Leu Xaa Asn Ala	Ser Xaa Ile Glu Xaa		
		80		85	
	Ile Leu Xaa	Asn Leu Xaa Pro Cys	Xaa Pro Xaa Xaa Thr		
	90		95		100
	Ala Xaa Pro	Xaa Arg Xaa Pro Ile	Xaa Ile Xaa Xaa Gly		
20	105		110		115
	Asp Trp Xaa	Glu Phe Arg Xaa Lys Leu	Xaa Phe Tyr Leu		
		120		125	
	Xaa Xaa Leu	Glu Xaa Ala Gln Xaa Gln Gln Thr Thr	Leu		
	130				
25	Ser Leu Ala	Ile Phe [SEQ ID NO:7]			

wherein m is 0 or 1; Xaa at position 18 is Asn or Ile; Xaa at position 19 is Met, Ala or Ile; Xaa at position 20 is Ile, Pro or Ile; Xaa at position 23 is Ile, Ala or Leu; Xaa at position 25 is Thr or His; Xaa at position 29 is Gln, Arg, Val or Ile; Xaa at position 32 is Leu, Ala, Asn or Arg; Xaa at position 34 is Leu or Ser; Xaa at position 37 is Phe, Pro, or Ser; Xaa at position 38 is Asn or Ala; Xaa at position 42 is Gly, Ala, Ser, Asp or Asn; Xaa at position 45 is Gln, Val, or Met; Xaa at position 46 is Asp or Ser; Xaa at position 49 is Met, Ile, Leu or Asp; Xaa at

position 50 is Glu or Asp; Xaa at position 51 is Asn Arg or  
 Ser; Xaa at position 55 is Arg, Leu, or Thr; Xaa at  
 position 56 is Pro or Ser; Xaa at position 59 is Glu or  
 Leu; Xaa at position 60 is Ala or Ser; Xaa at position 62  
 5 is Asn, Val or Pro; Xaa at position 63 is Arg or His; Xaa  
 at position 65 is Val or Ser; Xaa at position 67 is Ser,  
 Asn, His or Gln; Xaa at position 69 is Gln or Glu; Xaa at  
 position 73 is Ala or Gly; Xaa at position 76 is Ser, Ala  
 or Pro; Xaa at position 79 is Lys, Arg or Ser; Xaa at  
 10 position 82 is Leu, Glu, Val or Trp; Xaa at position 85 is  
 Leu or Val; Xaa at position 87 is Leu, Ser, Tyr; Xaa at  
 position 88 is Ala or Trp; Xaa at position 91 is Ala or  
 Pro; Xaa at position 93 is Pro or Ser; Xaa at position 95  
 is His or Thr; Xaa at position 98 is His, Ile, or Thr; Xaa  
 15 at position 100 is Lys or Arg; Xaa at position 101 is Asp,  
 Ala or Met; Xaa at position 105 is Asn or Glu; Xaa at  
 position 109 is Arg, Glu or Leu; Xaa at position 112 is Thr  
 or Gln; Xaa at position 116 is Lys, Val, Trp or Ser; Xaa at  
 position 117 is Thr or Ser; Xaa at position 120 is Asn,  
 20 Gln, or His; Xaa at position 123 is Ala or Glu; with the  
 proviso that from four to forty-four of the amino acids  
 designated by Xaa are different from the corresponding  
 amino acids of native human interleukin-3.

25           23.    The method of claim 21 wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

	1	5	10
	(Met <sub>m</sub> -Ala <sub>n</sub> ) <sub>p</sub> -Asn	Cys Ser Xaa Xaa Xaa Asp	Glu Xaa Ile
30	15	20	
	Xaa His Leu Lys Xaa Pro Pro Xaa Pro Xaa Leu Asp Xaa		
	25	30	35
	Xaa Asn Leu Asn Xaa Glu Asp Xaa Xaa Ile Leu Xaa Glu		

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	40		45
	Xaa Asn Leu Arg Xaa Xaa Asn Leu Xaa Xaa Phe Xaa Xaa		
	50	55	60
	Ala Xaa Lys Xaa Leu Xaa Asn Ala Ser Xaa Ile Glu Xaa		
5	65	70	75
	Ile Leu Xaa Asn Xaa Xaa Pro Cys Xaa Pro Xaa Ala Thr		
	80	85	
	Ala Xaa Pro Xaa Arg Xaa Pro Ile Xaa Ile Xaa Xaa Gly		
	90	95	100
10	Asp Trp Xaa Glu Phe Arg Xaa Lys Leu Xaa Phe Tyr Leu		
	105	110	
	Xaa Xaa Leu Glu Xaa Ala Gln Xaa Gln Gln [SEQ ID NO:8]		

wherein m is 0 or 1; n is 0 or 1; p is 0 or 1; Xaa at  
15 position 4 is Asn or Ile; Xaa at position 5 is Met, Ala or  
Ile; Xaa at position 6 is Ile, Pro or Leu; Xaa at position  
9 is Ile, Ala or Leu; Xaa at position 11 is Thr or His; Xaa  
at position 15 is Gln, Arg, Val or Ile; Xaa at position 18  
is Leu, Ala, Asn or Arg; Xaa at position 20 is Leu or Ser;  
20 Xaa at position 23 is Phe, Pro, or Ser; Xaa at position 24  
is Asn or Ala; Xaa at position 28 is Gly, Ala, Ser, Asp or  
Asn; Xaa at position 31 is Gln, Val, or Met; Xaa at  
position 32 is Asp or Ser; Xaa at position 35 is Met, Ile  
or Asp; Xaa at position 36 is Glu or Asp; Xaa at position  
25 37 is Asn, Arg or Ser; Xaa at position 41 is Arg, Leu, or  
Thr; Xaa at position 42 is Pro or Ser; Xaa at position 45  
is Glu or Leu; Xaa at position 46 is Ala or Ser; Xaa at  
position 48 is Asn, Val or Pro; Xaa at position 49 is Arg  
or His; Xaa at position 51 is Val or Ser; Xaa at position  
30 53 is Ser, Asn, His or Gln; Xaa at position 55 is Gln or  
Glu; Xaa at position 59 is Ala or Gly; Xaa at position 62  
is Ser, Ala or Pro; Xaa at position 65 is Lys, Arg or Ser;  
Xaa at position 67 is Leu, Glu, or Val; Xaa at position 68  
is Leu, Glu, Val or Trp; Xaa at position 71 is Leu or Val;  
35 Xaa at position 73 is Leu, Ser or Tyr; Xaa at position 74  
is Ala or Trp; Xaa at position 77 is Ala or Pro; Xaa at

position 79 is Pro or Ser; Xaa at position 81 is His or Thr; Xaa at position 84 is His, Ile, or Thr; Xaa at position 86 is Lys or Arg; Xaa at position 87 is Asp, Ala or Met; Xaa at position 91 is Asn or Glu; Xaa at position 5 95 is Arg, Glu, Leu; Xaa at position 98 Thr or Gln; Xaa at position 102 is Lys, Val, Trp or Ser; Xaa at position 103 is Thr or Ser; Xaa at position 106 is Asn, Gln, or His; Xaa at position 109 is Ala or Glu; with the proviso that from 10 four to forty-four of the amino acids designated by Xaa are different from the corresponding amino acids of native (15-125)human interleukin-3.

24. The method of claim 22 wherein said human interleukin-3 mutant polypeptide is of the Formula:  
15

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
Glu Asp Val Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
20 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:9];

25 Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
30 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:10];

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
35 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn

Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Ala  
Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu Ala  
Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly Asp  
5 Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr Leu  
Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:11];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
10 Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
15 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:12];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
20 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:13];  
25

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
30 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:14];  
35

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly



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Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 5 Asp Trp Gln Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:15];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 10 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 15 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:16];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 20 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:17];

25

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 30 Ala  
 Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu Ala  
 Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly Asp  
 Trp Asn Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser Leu  
 Glu His Ala Gln Glu Gln Gln [SEQ ID NO:18];

35

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu

Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 5 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:19];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
 10 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:20];

Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
 Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 20 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 25 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:21];

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 30 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:22];  
 35

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu

Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
5 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:23];

Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
10 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
15 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:24];

Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
20 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
25 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:25];

Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu  
Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
30 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:26];

35

Met Ala Asn Cys Ser Asn Met Ile Asp Glu Ile Ile Thr His Leu

Lys Gln Pro Pro Leu Pro Leu Leu Asp Phe Asn Asn Leu Asn Gly  
 Glu Asp Gln Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn  
 Leu Glu Ala Phe Asn Arg Ala Val Lys Ser Leu Gln Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 5 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:27];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 10 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 15 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:28];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 20 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 25 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:29];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 30 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Ala Ile Glu Ser Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu  
 Ala Thr Ala Ala Pro Thr Arg His Pro Ile His Ile Lys Asp Gly  
 Asp Trp Asn Glu Phe Arg Arg Lys Leu Thr Phe Tyr Leu Lys Thr  
 Leu Glu Asn Ala Gln Ala Gln Gln [SEQ ID NO:30];

35

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu

Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 5 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:31];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 10 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:32];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
 20 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 25 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:33];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 30 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:34];

35 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu

Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
5 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:35];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
10 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:36];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Val Pro Pro Ala Pro Leu Leu Asp Ser Asn Asn Leu Asn Ser  
20 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Leu Ala Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
25 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:37];

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
30 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:38];  
35

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu

Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Val Pro Cys Leu Pro Ser  
 5 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Thr Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Ser  
 Leu Glu His Ala Gln Glu Gln Gln [SEQ ID NO:39].

10 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala  
 Glu Asp Val Asp Ile Leu Met Asp Arg Asn Leu Arg Leu Ser Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 15 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:40]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ala Ile His His Leu  
 20 Lys Arg Pro Pro Ala Pro Ser Leu Asp Pro Asn Asn Leu Asn Asp  
 Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 25 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:41]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
 30 Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
 Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 35 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:42]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala

Glu Asp Val Asp Ile Leu Met Asp Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
5 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:43]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
10 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
Glu Asp Val Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
15 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:44]

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
20 Lys Arg Pro Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Asp  
Glu Asp Met Ser Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn  
Leu Glu Ser Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser  
Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
25 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:45]

Met Ala Tyr Pro Glu Thr Asp Tyr Lys Asp Asp Asp Asp Lys Asn  
Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu Lys Arg Pro  
30 Pro Ala Pro Leu Leu Asp Pro Asn Asn Leu Asn Ala Glu Asp Val  
Asp Ile Leu Met Glu Arg Asn Leu Arg Leu Pro Asn Leu Glu Ser  
Phe Val Arg Ala Val Lys Asn Leu Glu Asn Ala Ser Gly Ile Glu  
Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser Ala Thr Ala  
Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly Asp Trp Gln  
35 Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr Leu Glu Gln  
Ala Gln Glu Gln Gln [SEQ ID NO:46]



Met Ala Tyr Pro Glu Thr Asp Tyr Lys Asp Asp Asp Asp Lys Asn  
 Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu Lys Arg Pro  
 5 Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser Glu Asp Met  
 Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn Leu Leu Ala  
 Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser Gly Ile Glu  
 Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser Ala Thr Ala  
 Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly Asp Trp Gln  
 10 Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr Leu Glu Gln  
 Ala Gln Glu Gln Gln [SEQ ID NO:47] and

Met Ala Asn Cys Ser Ile Met Ile Asp Glu Leu Ile His His Leu  
 Lys Ile Pro Pro Asn Pro Ser Leu Asp Ser Ala Asn Leu Asn Ser  
 15 Glu Asp Val Ser Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 20 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:48].

25. The method of claim 23 wherein said human  
 interleukin-3 mutant polypeptide is of the Formula:

25 Met Ala Asn Cys Ser Ile Met Ile Asp Glu Ile Ile His His Leu  
 Lys Arg Pro Pro Asn Pro Leu Leu Asp Pro Asn Asn Leu Asn Ser  
 Glu Asp Met Asp Ile Leu Met Glu Arg Asn Leu Arg Thr Pro Asn  
 Leu Leu Ala Phe Val Arg Ala Val Lys His Leu Glu Asn Ala Ser  
 Gly Ile Glu Ala Ile Leu Arg Asn Leu Gln Pro Cys Leu Pro Ser  
 30 Ala Thr Ala Ala Pro Ser Arg His Pro Ile Ile Ile Lys Ala Gly  
 Asp Trp Gln Glu Phe Arg Glu Lys Leu Thr Phe Tyr Leu Val Thr  
 Leu Glu Gln Ala Gln Glu Gln Gln [SEQ ID NO:32].

26. The method as recited in claim  
 35 14,15,16,17,18,19,20,21,22,23,24 or 25 wherein said colony  
 stimulating factor is selected from the group consisting of  
 GM-CSF, G-CSF, and Meg-CSF.